FORESTRY ABSTRACTS

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FORESTRY ABSTRACTS

VOLUME 3 1942 NUMBER 3

THE CONTROL OF FOREST SEED ORIGIN IN THE BRITISH EMPIRE

MEASURES that have been adopted in countries on the continent of Europe to ensure or promote the use of the best seed in forest practice have recently been reviewed in *For. Abs.* 2 (271-5). In the British Empire such development has reached only a very elementary stage, as very few data are available on site races of native trees or on the relative suitability for introduction of the known different strains of exotic species. There are, in addition, other factors varying greatly from territory to territory, which militate to a varying extent against the adoption of control measures; among these are the different forms of ownership of forest land and the relatively early stage reached in organized management. The importance of using seed of suitable provenance is, however, becoming more widely recognized, and an increasing amount of research work is now in progress in many parts of the Empire.

Most of the tree seed required is collected locally, whether the species is native or introduced. The first steps to ensure seed of good type are as a rule a survey of existing crops to determine whether there are any recognizably different strains, and tests to see to what extent they pass on their characteristics to their offspring. In Britain, the matter is complicated by the high proportion of imported material, usually of unknown origin, but evidence is accumulating to indicate that Scots Pine and perhaps Beech are present in more than one racial type with heritable characters of importance in forest practice, such as bole and crown form. In India, a comprehensive investigation into the existence and inheritance of racial strains of Teak has already been in progress for several years with quite definite results, at least for the earlier stages of development. Experimental work at the Petawawa Forest Experiment Station of the Dominion Forest Service of Canada includes the testing of different strains of native forest species, notably Poplars, various Pines and Douglas Fir. The results indicate significant variations in such important factors as frost hardiness, resistance to disease, and rate of growth.

The existence of racial strains with desirable or undesirable characters having been demonstrated or suspected, it is an easy step to direct the collection of seed to acceptable localities, stands and even trees, and to discourage collection from inferior or unexamined sources.

One of the commonest results of seed-origin experiments has been the demonstration of the superiority of the local strain over imported ones, readily ascribable to inherited adaptation to the local habitat conditions. A similar explanation should apply to the frequently recorded superiority of seed from good local plantations of introduced species over most new introductions, as has been found for Larch in Great Britain. In Kenya, there is no record available of the origin of the seed-bearing plantations of the two main softwood plantation species, *Cupressus macrocarpa* and *C. lusitanica*, so local selection is strongly indicated as the safest method for use there. Similarly, in Great Britain as much Larch seed as is possible is now collected from approved stands in this country and the Forestry Commission has, since about 1932, had a standard procedure of recording all that is known of every lot of seed used and where it is used. There are thus strong grounds for collecting locally all the seed required for local use and this has the additional advantage of facilitating supervision to ensure that the seed is collected from good plantations and individuals. Risks are in this way reduced of getting seed from defective parents which may possibly transmit their defects, as has been demonstrated to occur with *Pinus longifolia* in India.

This procedure is widely adopted throughout the Empire in temperate, subtropical and tropical climes. As by far the greater part of the plantation work is done by the State forestry authorities, these measures go far towards ensuring the use of acceptable seed origin though the details of procedure could well be tightened up in various quarters.

There are many investigations in hand in which seed lots have been segregated by age groups of the parent stands within a growth region (e.g. British Columbia), by form groups, or even by individual seedbearers (e.g. Mahogany in British Honduras) though the value of the procedure has yet to be established for most instances. Most of the forest services distribute seed directly to other Government Departments and to private consumers, free or on payment, and commonly supply from the same stocks as they themselves use. They may also procure additional supplies of imported seed for such distribution (Kenya and some Indian provinces) and then usually give out origin data with the seed.

There is an appreciable interchange of forest tree seed among the Empire territories and it is usual for special care to be taken over the supplies sent out and origin data to accompany them. Thus *Eucalyptus* seed is widely distributed from Australia and Tasmania, and Teak seed from Burma, whilst exotic Pine seed (*P. radiata*, *pinaster*, *patula* and *canariensis*) is distributed from South Africa and Australia. There are also numerous instances of the supply of seed of recorded origin by the forest services of foreign countries, e.g. seed of the very satisfactory Leiria strain of *Pinus pinaster* by the Portuguese Forest Service to Western Australia.

There is nowhere in the Empire any official origin certification for exported seed, though the necessary steps have been taken on occasion to meet special demands. Where Forest Departments have depended on importing through dealers, they have generally only dealt with reputable firms known to be reliable from past experience. New firms are given small-scale trials in the first place. With many species, notably the commonly grown softwoods, it has soon become possible to stop importing and to rely on locally collected seed from well grown plantations. On the whole, there appears to be a body of feeling that official certification is desirable, but the need has not been urgent enough to lead to action.

ABSTRACT SECTION

NOTE.—A capital letter in square brackets following the reference denotes the language in which the paper is written. A small letter denotes a summary in another or the same language, e.g. [G.e.]—German, with English summary. English [E.] is only indicated for papers published in journals usually written in foreign languages.

The term "billion" used in papers originating in North America means a thousand million.

0. GENERAL FORESTRY

01. BIBLIOGRAPHY

01.6 (73). ZIMMERMAN, F. L., and READ, P. R. [Compilers.] **List of available publications of the United States Department of Agriculture, January 2, 1941.** *Misc. Publ. U.S. Dep. Agric.* No. 60, (revised ed.) 1941. pp. 212.

01.6 : 31.1 : 33.11 : 34.26. **List of publications on the growth, structure, and identification of wood.** U.S. Forest Products Laboratory, Madison, Wis. No. *R*177, 1941. pp. 38. P.R.

01.6 : 33.15. **List of publications on glue and plywood.** U.S. Forest Products Laboratory, Madison, Wis. No. *R*513, 1940. pp. 10. P.R.

01.6 : 33.3 : 31.3. **List of publications on chemistry of wood and derived products.** U.S. Forest Products Laboratory, Madison, Wis. No. *R*238, 1941. pp. 38. P.R.

01.6 : 33.32. **List of reference works on pulp and paper.** U.S. Forest Products Laboratory, Madison, Wis. No. *R*564, 1941. pp. 10. P.R.

01.6 : 33.36. **List of publications on wood preservation.** U.S. Forest Products Laboratory, Madison, Wis. No. *R*704, 1941. pp. 26. P.R.

01.6 : 33.36.3. **List of publications on the seasoning of wood.** U.S. Forest Products Laboratory, Madison, Wis. No. *R*446, 1941. pp. 19. P.R.

02. DICTIONARIES. LISTS OF VERNACULAR NAMES

02. RABER, O. **German-English dictionary for foresters.** U.S.D.A. Forest Service, Washington, D.C. 1939. pp. 346.

This compact mimeographed dictionary contains an astonishing number of entries for its size, and its virtues will be evident to any forester who consults it. An especially welcome feature is that besides forestry terms proper, which are more adequately covered than in any other German-English technical dictionary known to the reviewer, it contains a generous admixture of useful words from allied fields with which foresters should be conversant, such as botany, entomology, geology, soil science, chemistry, engineering, recreation, wildlife management, soil conservation, and land use. Without detracting from what has been said—for misprints are few and the English senses are in general very competently dealt with—one feature of the work calls for some criticism. It is that rather too much space has been allotted to everyday words that can be found in elementary dictionaries and to 'international' terms. A demand will almost certainly arise for more editions of the present work, and the hope may be expressed that its utility will then be still further increased by excluding words such as *Beispiel*, *Fisch*, *Garten*, *Delta*, *Kambium*, *Methode* in favour of useful technical terms not already covered, such as *Bestandesmantel*, *Bläue*, *Holzmehl*, *Holzverzuckerung*, *Vollumbruch*, and the like. There is, however, not the least doubt that this book should find a place in the library of any English-speaking forester who wishes to read German forestry literature. P. G. B.

02.41 (68.6). MILLER, O. B. **Native names in use in Swaziland for trees, shrubs and other plants.** *J. S. Afr. For. Ass.* 6, 1941 (89–97).

Lists are given of botanical names with native equivalents.

05.3. *Annual Reports*

05.3 (54) : 07.2 : 32.29.2 : 31.27 : 33.36.1 : 23 : 12.26–8. INDIA. **Forest research in India**

and Burma, 1939–40. Pt. I.—The Forest Research Institute, Dehra Dun. Manager of Publications, Delhi. 1941. pp. 133.

05.3 (54.3). CENTRAL PROVINCES AND BERAR. **Administration report on the Forest Department in the Central Provinces & Berar for the year ending the 31st March, 1940.** Govt. Printing, Nagpur. 1941. pp. 38.

05.3 (54.8) : 2. MADRAS. **Annual report on silvicultural research in the Madras Presidency for the year 1939–40.** Supt., Govt. Press, Madras. 1941. pp. 165.

05.3 (54.8). TRAVANCORE. **Administration report of the Forest Department. 1115 M.E. [16th August, 1939 to 15th August, 1940.]** Supt., Govt. Press, Trivandrum. 1941. pp. 124.

05.3 (59.1) : 2 : 45.3 : 67. BURMA. **Annual report on working plans, silviculture, and entomology in Burma for the year 1939–40.** Supt., Govt. Printing and Stationery, Rangoon. 1941. pp. 129.

05.3 (66.4). SIERRA LEONE. **Forestry report for the year 1940.** Govt. Printer, Freetown. 1941. pp. 12.

05.3 (66.7). GOLD COAST. **Report on the Forestry Department for the year 1940–41.** Govt. Printer, Accra. 1941. pp. 6.

05.3 (66.9). NIGERIA. **Annual report on the forest administration of Nigeria for the year 1940.** Govt. Printer, Lagos. 1941. pp. 14.

05.3 (67.8). TANGANYIKA. **The nineteenth annual report of the Forest Department, Tanganyika Territory, 1939.** Govt. Printer, Dar es Salaam. 1941. pp. 8.

05.3 (67.8). TANGANYIKA. **The twentieth annual report of the Forest Department, Tanganyika Territory, 1940.** Govt. Printer, Dar es Salaam. 1941. pp. 7.

05.3 (729.7). TRINIDAD AND TOBAGO. **Administration report of the Conservator of Forests for the year 1940.** *Council Paper*, No. 21 of 1941. Govt. Printer, Trinidad and Tobago. 1941. pp. 6.

05.3 (73) : 44. UNITED STATES. **Report of the Chief of the Bureau of Plant Industry, 1940.** Supt. of Documents, Washington, D.C. 1940. pp. 56.

05.3 (74.7). NEW YORK STATE. **Cornell University Agricultural Experiment Station. Fifty-second annual report, 1939.** Albany, N.Y. 1940. pp. 203.

05.3 (74.8–75.2) : 11.62.31 : 2. UNITED STATES. **Annual report of the Allegheny Forest Experiment Station, 1940.** Philadelphia, Pa. [1941.] pp. 23.

05.3 (77.2) : 23.26 : 24.4 : 35. INDIANA. **Fifty-second annual report of Purdue University Agricultural Experiment Station, for the year ending June 30, 1939.** [Forestry Department, pp. 85–91.] Lafayette, Ind. 1939. pp. 142.

05.3 (77.2) : 11.47.1 : 24.4. INDIANA. **Fifty-third annual report of Purdue University Agricultural Experiment Station, for the year ending June 30, 1940.** [Forestry Department, pp. 66–70.] Lafayette, Ind. 1940. pp. 112.

05.3 (78.6). MONTANA. **Twelfth report of the State Forester for the period July 1, 1938, to June 30, 1940, including also the first reports of the Montana State Board of Forestry and the Montana State Park Commission.** Missoula. [1941.] pp. 35.

05.3 (79.5 : 79.7). UNITED STATES. **Forest research: 1940. Pacific Northwest Forest and Range Experiment Station.** Portland, Oregon. [1941.] pp. 26.

05.3 (931). NEW ZEALAND. **Fifteenth annual report of the Department of Scientific and Industrial Research.** Govt. Printer, Wellington. 1941. pp. 92.

05.3 (94) : 12.25 : 12.11.22 : 24.2 : 24.5. AUSTRALIA. **Annual report of the Commonwealth Forestry Bureau for year 1940.** Govt. Printer, Canberra. 1941. pp. 16.

07. EDUCATION AND RESEARCH

07.1 (92). Advies nopens organisatie en inrichting van een faculteit van landbouwwetenschap. **[Advisory report concerning the organization and establishment of a faculty of agricultural science.]** *Tectona* 34, 1941 (331–432 + appendices, pp. 89). [Du.]

The report and recommendations of an advisory committee appointed by the government of the Dutch East Indies to inquire into all matters connected with the establishment in this territory of a regular faculty to provide higher education in every branch of agricultural science, including forestry.

07.2 (76.3 : 75.8–76.6). DEMMON, E. L. **Twenty years of forest research in the**

South, 1921–41. *Sth. Lumberm.* 163 (2049), 1941 (29–31). [Southern Forest Exp. Sta.]

With reference to the Southern United States.

09.1. *Forest History*

09.1 (68) : 32. KING, N. L. **The exploitation of the indigenous forests of South Africa.** *J. S. Afr. For. Ass.* 6, 1941 (26–48). [Division of Forestry, S. Africa.]

The indigenous forests of South Africa, which occupy an area less than 0·2 per cent. of the total extent of the country, have in general been heavily overcut since exploitation began, but in the process they have made an important contribution to the economy of the country by supplying material necessary to its development. The exploitation history of these forests is presented for each Conservancy separately.

09.1 (922) : 61 : 12.26–8. ZWART, W. De opname en kaarteering der djatibosschen op Java en Madoera. 13 Februari, 1860—30 Juni, 1871. **[The survey and mapping of the Teak forests of Java and Madura. 13th February, 1860—30th June, 1871.]** *Tectona* 34, 1941 (235–85). [Du.]

A historical review is given of this survey, which was the first to be made in Java and Madura. The present location of many of the maps is unknown.

09.2. *Pre-history*

09.2 (54.1) : 12.26–8. GHOSH, A. K. **Submerged forest in Calcutta.** *Science & Culture* 6, 1941 (669–70). [Calcutta University.] L.S.

Tree stumps recovered from a depth of nearly 30 ft. from the surface (below the upper peat layer of Calcutta soil) in the Dhakuria lake in Calcutta provide evidence that an extensive forest in this region was buried by gradual silting up, over a period of about 2,000 years, of an area that was once the delta of the Ganges. The remains have been identified as *Heritiera fomes* Buch. (*H. minor* Lam.), a species characteristic of littoral forests, growing in mud at levels of 2 to about 10 ft. below high water mark.

09.2 (77.2). SWICKARD, D. A. **Comparison of pollen spectra from bogs of Early and Late Wisconsin glaciation in Indiana.** *Butler Univ. bot. Stud.* 5, 1941 (67–84). L.S.

Pollen spectra are presented from Yountsville bog, in an Early Wisconsin glaciation region, and Mill Creek bog, in a Late Wisconsin region. Both bogs showed a forest controlled by an *Abies/Picea* climax while the lower levels were being deposited, but this community persisted to higher levels in the Yountsville bog. Mill Creek bog showed dominance by *Pinus* at the 46-ft. level, while at Yountsville *Pinus* was present in low percentages throughout the spectrum. *Quercus* became dominant in Mill Creek bog at the 44-ft. level and remained so to the top levels. At Yountsville bog, *Quercus* dominated from the 11-ft. level upwards, but gave way to a *Quercus/Acer* association at the 0·5-ft. and top levels. The successions were:—Yountsville—*Abies*, *Picea/Abies*, *Quercus*, *Quercus/Acer*; Mill Creek—*Abies*, *Picea/Abies*, *Pinus*, *Pinus/Quercus*, *Quercus*. The relation of these findings to evidence from other studies, and the climatic changes indicated, are discussed.

09.2 (79.5). HANSEN, H. P. **Paleoecology of a peat deposit in west central Oregon.** *Amer. J. Bot.* 28, 1941 (206–12). [Oregon State College, Corvallis.] O.B.D.

Pollen analysis of a post-Vashon deposit in the Hemlock/Cedar climax of west central Oregon shows that postglacial forest succession differed from that in the Puget Sound region [*For. Abs.* 3 (97) and references there cited]. This may have been due to the existence of forests in the Coast Range of Oregon during the latter part of the Pleistocene and the occurrence of many periodic fires during postglacial time. Sharp fluctuations of Douglas Fir in the lower levels, with corresponding converse variations by Western Hemlock and Lowland White Fir, suggest recurring fires that prevented Hemlock from becoming the chief dominant. This is further corroborated by the presence of charred peat at four levels in the profile. Volcanic ash and silt is present between the 6- and 7-ft. horizons. Douglas Fir records unusually high proportions in the upper half of the profile. Lodgepole Pine records its only high percentage at the same level where silt and volcanic ash occur. Whereas the forest succession has apparently been largely influenced by fire, permitting Douglas Fir to remain predominant, the greatest abundance of Hemlock, Lowland White Fir, and Western White Pine pollen in the lower strata suggests an initial cool and

humid period. A gradual warming and perhaps drying of the climate then followed to a stage that has in general persisted to the present. *From author's summary.*

09.2 : 12.26–8. BERRY, E. W. ***Liriodendron* in the Miocene of America and eastern Asia.** *Torreya* 41, 1941 (82–4) [John Hopkins University.] L.S.

Remains of *Liriodendron* spp. recently found in the Miocene of Washington and the Neogene and Miocene of Japan and Korea help to bridge the wide geographical gap between the modern species *L. tulipifera* and *L. chinensis.*

09.4. *Forest Statistics*

09.4 (41.5) : 90. **The wood resources of Ireland.** *Wood* 6, 1941 (219, 228).

09.4 (492 : 493) : 98. JUNGHANS, W. Die Lage der Holzwirtschaft Belgiens und der Niederlande unter Kriegsverhältnissen. **[The position of the timber industry of Belgium and Holland under war conditions.]** *Z. Weltforstwirt.* 1940 (509–66). Abstr. in *Forstarchiv* 17, 1941 (147–8). [G.]

Belgium and Holland have only small home timber resources and are mainly dependent upon imports to supply their timber requirements. This dependence is increased in both countries by the existence of manufacturing industries that export timber products. Home production and home consumption (in millions of cu. m. solid measure) are 1·75 and 5·49, respectively, for Belgium, and 0·7 and 5·82, respectively, for Holland. Thus to cover home consumption alone the annual cut would have to be raised by 300 per cent. in Belgium and by 800 per cent. in Holland, and the existing resources would rapidly disappear. Both countries possess large colonial timber resources but these are either insufficiently developed or too far from the mother countries to supply them with timber on a large scale.

The data presented relate to conditions previous to the German occupation of Belgium and Holland.

09.4 (73) : 98.3. STEER, H. B. **Stumpage and log prices for the calendar year 1939.** *Statist. Bull. U.S. Dep. Agric.* No. 75, 1941. pp. 67. [U.S. Forest Service.]

09.4 (75.6). CRUIKSHANK, J. W. **Forest resources of the mountain region of North Carolina.** *For. Surv. Release Appal. For. Exp. Sta.* No. 7, 1941. pp. 55.

09.4 (76.1). CRUIKSHANK, J. W. **Forest resources of north central Alabama.** *For. Surv. Release Sth. For. Exp. Sta.* No. 50, 1940. pp. 36.

09.4 (76.3 : 75.8–76.6) : 33 : 98.1 : 97.4. SMITH, H. F. **Primary wood-products industries in the lower South.** *For. Surv. Release Sth. For. Exp. Sta.* No. 51, 1940. pp. 19.

Of the total volume of wood cut from the forests in 1937 the lumber industry accounted for 53·4 per cent., fuelwood 19·6, sleepers 7·2, pulpwood 5·0, veneer 3·2, cooperage 2·3, and miscellaneous 9·3 per cent. The position of the more important commercial wood-products industries is analysed.

09.4 (76.4). DAVIS, V. B. **A cursory survey of the forest resource of the East Texas Post Oak Belt.** *For. Surv. Release Sth. For. Exp. Sta.* No. 52, 1940. pp. 9.

09.4 (77.4). CUNNINGHAM, R. N., and WHITE, H. G. **Forest resources of the Upper Peninsula of Michigan.** *Misc. Publ. U.S. Dep. Agric.* No. 429, 1941. pp. 32 + map. [Lake States Forest Exp. Sta.]

A summary of statistical data for this region shows approximate totals as follows: Timber volume—saw timber 23 billion bd. ft., high-grade pulpwood 11 million cords, chemical wood 27 million cords, White Cedar poles 21 million pieces. Annual increment—saw timber 344 million bd. ft., all wood 161 million cu. ft. Timber cut and destroyed annually—saw timber 758 million bd. ft., all wood 247 million cu. ft.

09.4 (79.5). **Southern Oregon.** *W. Cst. Lumberm.* 68 (8), 1941 (11–2, 14).

South-western Oregon, where in the past there has been relatively little development of the lumber industry, is now being considered as the major Douglas-Fir-producing region. The total timber stand is estimated at 96,162 billion bd. ft. of which 75,329 billion bd. ft. is Douglas Fir. In addition, there are 9,504 billion ft. of pulp species. Two-thirds of the timber in the region is owned by the Government.

09.4 (79.5) : 97.4. CORNWALL, G. F. **Developments in Douglas [County, Oregon]: new center of lumber activity.** *Timberman* 42 (12), 1940–41 (18–9, 56).

The timber resources of Douglas County, which amount to 60–70 billion bd. ft. of which

42 billion ft. is old-growth Douglas Fir, are just beginning to be developed and under planned management could supply an annual half a billion bd. ft. of forest products indefinitely. Ownership of the forest wealth of this county is divided fairly evenly between private lands, revested grant lands and national forest lands.

09.4 (79.6). **Forest statistics for Northern Idaho.** *For. Surv. Statist. Serv. Nth. Rocky Mt. For. & Range Exp. Sta.* No. 1, 1941. pp. 17.

09.4 (921) : 09.7 : 65. BIANCHI, A. T. J. Verslag omtrent de proefbaan-opname van 1940 in het boschcomplex Semangoes (Res. Palembang). **[Report on the strip survey of 1940 in the Semangoes forest reserve (Residency of Palembang).]** *Tectona* 34, 1941 (286–328). [Du.du.e.]

The results are given of a 1-per-cent. strip survey of this projected exploitation area, extending over some 20,000 ha., in the Residency of Palembang, Sumatra. The timber volume was calculated for all trees in the strips with diameters of 35 cm. or more. The average stand per ha. was 43 trees with a volume of 109 cu. m., which is regarded as fairly high for the region. More than 200 species occur, but the bulk of the timber is represented by comparatively few of these. Fourteen species of Dipterocarpaceae account for 40 per cent. of the volume, two-thirds of this figure being made up of light Red Meranti (*Shorea* spp.). Species of Burseraceae contribute about 9 per cent. of the volume. Red Meranti (31·7 cu. m. per ha.) is by far the most important species-group and is suitable for boards and plywood. About a quarter of the volume in this group is made up by larger trees, which are often hollow. White Meranti (other spp. of *Shorea*), with an average volume of 7·7 cu. m. per ha., and probably some of the Burseraceae and other species are also suitable for plywood. Further species that are valuable for various purposes include Merawan (*Hopea*, 2·4 cu. m. per ha.), Merbau (*Intsia*, 1·4 cu. m. per ha.), Petaling (*Ochanostachys amentacea*, 1·8 cu. m. per ha.), Kulim (*Scorodocarpus*, 0·5 cu. m. per ha.), Kempas (*Koompassia malaccensis*, 4·7 cu. m. per ha.), Lebuai (*Dyera costulata*, 2·2 cu. m. per ha.), and Kajulabu (*Endospermum*, 1·3 cu. m. per ha.). Detailed tables are appended of the species and their volume.

09.7. *Monographs of Individual Forest Regions*

09.7 (43.7) : 34.21 : 11.47.6 : 64 : 60.31.2. ERLBECK. Der Bauernwald auf der nordböhmischen Sandsteinplatte. (Gerichtsbezirke Böhmisch-Leipa und Dauba, Sudetengau). **[The peasant forest on the north-Bohemian sandstone plateau. (Judicial districts of Böhmisch-Leipa and Dauba, Sudetengau).]** *Thar. forstl. Jb.* 91, 1940 (78–94). [G.] R.M.I.

A description of the forest of these Sudeten districts and its ownership (whether privately or State owned, etc.), followed by an evaluation of yield capacity and production. The conclusion is reached that litter removal, which has been intensively practised for years, results in a systematic lowering of the yield capacity of the forest soil.

09.7 (54.5). WRIGHT, H. L. **Forestry beyond the frontier.** *Emp. For. J.* 20, 1941 (11–5).

An account of how the Indian Forest Department is attempting to introduce forest conservancy in tribal territory on the North West Frontier. *Author's summary.* [Cf. *For. Abs.* 1 (124–5).]

09.7 (728.1) : 12.19. STANDLEY, P. C. **The forests of Guatemala.** *Trop. Woods* No. 67, 1941 (1–18). [Field Museum of Natural History.]

A brief account is given, mainly from the plant geographer's point of view, of the chief forest types of Guatemala and their principal or interesting species. Owing to the very wide range of altitude, climate, and geological conditions, the flora is rich in species and vegetation types are diversified. In spite of government regulations to restrict cutting, serious inroads are being made upon the forests and erosion is a menace throughout the volcanic part of the country.

09.7 (75.6). FROTHINGHAM, E. H. **Forestry on the Biltmore Estate, Biltmore, N.C.** *Tech. Note Appal. For. Exp. Sta.* No. 43, 1941, pp. 22.

Brief summaries of the more important plantations and thinning operations on an area in North Carolina that has been under forest management since 1892.

09.7 (79.8) : 33.02 : 33.32 : 97.4. GREFNES, M. W. **Alaska: pulp and paper possibilities.** *Timberman* 42 (12), 1940–41 (26–32).

The development of private enterprise in Alaska is desirable and certain natural conditions in that country appear to favour the establishment of a pulp and paper industry. The timber resources of importance are in the Tougass National Forest, in the south-east, where the principal species are Sitka Spruce, Western Hemlock (which is deteriorating), and Alaska Cedar (*Chamaecyparis nootkatensis*). This forest has an area of 16 million acres and most of its timber stands contain 25,000 bd. ft. per acre or more. They are fairly near tidewater, are seldom above 1,500 ft. elevation, and could be logged without undue expense or difficulties. Also there is excellent water power within the forest. It has been estimated that this forest could produce about 750 million bd. ft. annually. At present some 700 million ft. are wasted each year in Alaska through failure to cut. The early development of this enterprise is not considered likely owing to economic difficulties, in particular competition from other sources for the important markets.

09.7 (941) : 12.19.2 : 12.26–8 : 33.06 : 35.51 : 31.0 : .2 : 11.14 : 11.4. BROCKWAY, G. E. **Forests of the arid goldfields region of Western Australia.** *Emp. For. J.* 20, 1941 (16–24).

The low-rainfall forests in the southern interior of Western Australia fall into two distinct zones, the Eucalypt forest in the south and the more northern Mulga (*Acacia*) forest. These forests are of particular importance in supplying wood for the mining industry. Brief notes are given on geology, topography, soils, rainfall, forest types and rate of growth in this region, on the properties of the timbers and on exploitation practice. The methods of supplying 200,000 tons of firewood per annum from forest carrying 3 to 4 tons per acre and the silvicultural problems of these forests are discussed.

1. FUNDAMENTAL NATURAL LAWS OF THE FOREST

11.1. *Atmosphere*

11.1 : 11.2. KOTOK, E. I. **The forester's dependence on the science of meteorology.** *Amer. Met. Soc. Bull.* 21, 1940 (383–4, 397–406). E.S.R. 85 (12).

11.4. *Soil*

11.4 (946) : 11.2 : 11.34 : 12.19.2 : 12.19.3 : 60 : 97.1. STEPHENS, C. G. **The soils of Tasmania.** *Bull. Coun. sci. industr. Res. Aust.* No. 139, 1941. pp. 40 + map.

Included is a summary of the available information on geology and topography, climate, soils and vegetation, and land use and soil problems. The scale of the soil map is 20 miles to an inch.

11.43. Biology of Soil, including Mycorrhiza

11.43.1 : 12.26–8 : 12.11.12 : 12.21. PLOTHO, O. VON. Die Synthese der Knöllchen an den Wurzeln der Erle. **[Synthesis of the root nodules of Alder.]** *Arch. Mikrobiol.* 12, 1941 (1–18). [G.g.] [Institut für Mikrobiologie, Universität Göttingen.] R.B.D.S.

Actinomyces alni was isolated in culture from root nodules of *Alnus incana* and used for inoculating practically N-free, sterile water cultures of *Alnus glutinosa* seedlings. Nodules appeared on these, but not on uninoculated controls. Determinations of the N contents of the nutrient solution and of the inoculated seedlings showed that considerable amounts of atmospheric N had been fixed by the nodule organism, and that the amount so fixed varied directly with the development of the seedlings. The latter conclusion was confirmed by further determinations of the percentage N content (based on dry plant weight) of shoots and leaves, which also indicated that after an initial period of N starvation up to the time of nodule formation the N content of inoculated seedlings in practically N-free cultures rapidly approached that of uninoculated seedlings supplied with KNO_3. Uninoculated plants grown in N-free cultures quickly succumbed. No evidence was found of any excretion of organic N compounds from the root nodules in water cultures, as claimed by Virtanen. In the nodules and adjacent root cells there were accumulations of carbohydrates, which are probably used in the process of N fixation.

11.45. Geological Conditions

11.45 : 12.19.2 : 12.26–8 (78 : 79). IVES, R. L. **Vegetative indicators of solifluction.** *J.*

Geomorph. 4 (2), 1941 (128–32). Soil Conserv. Lit. 5 (133).

In the southern Rocky Mountains, the presence of erratically spaced patches of Aspen in the normal evergreen forests of the montane forest zone is a rather consistent indicator of soil motion.

11.47. Maintenance of Favourable Soil Conditions

11.47.1 : 23.26.4. WILDE, S. A. **What the Department has learned in nursery soil management.** *Wis. Conserv. Bull.* 5 (10), 1940 (3–6).

The most satisfactory nursery soils were found to be light, sandy soils with about 10–15 per cent. colloids, artificially irrigated and supplied with organic material and fertilizers. Nutrient conditions similar to those of virgin soils, as determined by analysis of such soils bearing important Wisconsin tree species, improved seedling development. Highly acid or alkaline soil conditions should be avoided as they render nutrients unavailable to the seedlings. The optimum pH is about 5·5. The best means of soil parasite control thus far discovered is the application of sulphuric acid in a concentration varying from 1 to 2 per cent. by volume at a rate of 7 gal. per 100 sq. ft. Weakened or injured seedlings can be revived by the application of 'liquid humate', a suspension of humus and high-grade synthetic fertilizers.

11.47.1: 23.26.4 : 11.47.6. WILDE, S. A. **A balanced diet for nursery stock.** *Better Crops with Plant Food* 25 (6), 1941 (14–6, 40–2). [Agricultural Exp. Sta., Madison, Wis.] L.S.

Data from analyses of virgin soils under productive stands of the various tree species offer the closest indication of the amount and balance of plant nutrients required by seedlings, and may be used with advantage in determining nursery fertilizer requirements. Average values obtained by statistical treatment of the results of several thousand soil samples from productive stands of representative species throughout the Lake States are presented in the accompanying table, and are suggested as standards for maintaining nursery soil fertility. The $N/P_2O_5/K_2O$ ratio of available nutrients approaches 1:2:5 for the conifers and Yellow Birch, and 1:3:5 for the remaining hardwoods studied. Use of these suggested standards has given satisfactory results in forest nurseries in Wisconsin and neighbouring states, and field planting trials have shown a higher survival and quicker growth of planting stock raised on nursery soils treated with balanced fertilizers. Although the standards, used in conjunction with soil and fertilizer analyses, render simple the calculation of the amounts of fertilizers to be applied, it is pointed out that not all nursery soils can be brought to a satisfactory level of fertility by a single application of salts and absorbing colloids; time may be required for the attainment of a proper balance of soil conditions, and thus in soils of low fertility it may be desirable to spread the soil-improvement programme over several years. [Cf. also *For. Abs.* 1 (78).]

Nursery soil fertility standards for blocks of various species

Species	*pH*	*Base exchange capacity m.e./ 100 g.*	*Total N per cent.*	*Approximate level of available N*	*Available P_2O_5*	*Available K_2O*	*Replaceable Ca.*
			Pounds per acre				
Jack Pine	5·6	5·0	0·10	20	40	100	1,000
Red and Scots Pines	5·4	8·0	0·12	30	50	150	1,500
White Pine	5·4	10·0	0·14	35	80	200	2,500
White and Norway Spruces	5·2	15·0	0·25	45	100	250	3,000
Yellow Birch	5·3	12·0	0·16	35	60	175	2,000
Hard Maple, Am. Elm, and Basswood	5·8	14·0	0·20	45	150	275	3,500
White Ash	6·2	16·0	0·22	55	185	300	4,500

11.47.13. NAFZIGER, J. Bodenuntersuchungsergebnisse zum Kalkdüngungsversuch I. [**Results of soil investigations in connexion with 'liming experiment I'.**] *Forstwiss. Cbl.* 62, 1940 (59). *Abstr.* in *Forstarchiv* 17, 1941 (145). [G.]

Soil investigations in connexion with the

liming experiment described by Fabricius [*For. Abs.* 1 (77).] showed that the rate of application—2,500 kg. $CaCO_3$ per ha.—was correct. Even after 10 years the lime has been retained substantially in the top soil, of which the pH in limed plots was determined as 4·56, compared with 3·56 for that of unlimed plots.

11.47.13 : 12.25 : 23.26.4. MARTH, P. C., and GARDNER, F. E. **Responses of coniferous evergreens to fertilizer applications.** *Proc. Amer. Soc. hort. Sci. 1940*, 38, 1941 (709–14). [U.S. Horticultural Sta., Beltsville, Md.] E.M.B.

A 4-year study of the effect of fertilizing nursery stock of horticultural varieties of *Thuja occidentalis* and *Juniperus communis* showed that under the conditions of the experiment (i) N fertilizers at suitable rates (not to exceed 200 lb. per acre) gave increased growth; (ii) NPK was better than N alone or N in combination with P or K separately; (iii) with continuous use, nitrate of soda and urea were better sources of N than sulphate of ammonia; and (iv) a NPK fertilizer approximating a 2–9–14 standard-grade commercial fertilizer, applied in spring and late summer at 1,400 lb. per acre, gave consistently satisfactory results with both species.

11.47.13 : 12.26–8 : 23.24. INDIANA. **Fifty-third annual report of Purdue University Agricultural Experiment Station, for the year ending June 30, 1940.** Lafayette, Ind. 1940. pp. 112.

One-year Black Locust seedlings raised under uniform conditions were planted in a compact subsoil from which the topsoil had been eroded, half the seedlings being treated with fertilizer and the other half untreated. Results were as follows: (1) There was no difference in survival of fertilized and unfertilized trees or of different grades of planting stock; (2) height growth and basal diameter of fertilized trees was twice that of unfertilized ones at the end of the first growing season; (3) root development of the fertilized trees was five times that of unfertilized ones; (4) nodules on fertilized trees appeared to be more numerous and larger; (5) one tablespoon of fertilizer per seedling appeared to give as good results as two tablespoonfuls (pp. 66–8).

11.47.13 : 12.26–8. DREES, E. M. Nadere gegevens over eenige bemestingsproeven met djati. [**Further results of some manuring experiments with Teak.**] *Tectona* 33, 1940 (591–606). [Du.du.e.]

Further results are presented from experiments described by Coster [*Tectona* 26, 1933 (742–62)] and from a fresh experiment in Tjilalanang. Applications of ammonium sulphate, potassium chloride and slaked lime had little or no beneficial effect upon the growth of Teak in any of the plots. Superphosphate at 100 kg. per ha. had in some cases a beneficial effect, in some cases a beneficial effect while the trees were young followed by a relapse as they grew older, and in other cases no observable effect. The favourable reactions occurred only on the poorest soils, which are really unsuitable for Teak growing. In no case, however, was superphosphate detrimental. Its effects varied widely on the different soils, and as knowledge of these is very scanty, field trials would be necessary to determine the effect of superphosphate on Teak growth for any particular site. Such trials, however, could rarely be undertaken in practice, as they would have to extend over about 10 years to give reliable results. On the other hand, phosphate fertilizing usually benefits the agricultural crops in *taungya* plantations, and for this purpose field trials need not occupy more than a year or two.

11.47.2 : 12.19.2 : 12.19.3 : 11.44 : 11.42 : 11.41. AUTEN, J. T. **Forest soil properties associated with continuous Oak, old-field Pine, and abandoned field cover in Vinton County, Ohio.** *Tech. Note cent. St. For. Exp. Sta.* No. 34, 1941. pp. 8.

A study was made of soil conditions under a 65-year-old Shortleaf Pine stand that regenerated naturally on an abandoned old field, under second-growth Chestnut Oak and White Oak stands whose soils had not been broken, and on an abandoned field. Under the Shortleaf Pine, Chestnut Oak and White Oak respectively the litter accumulation was 26,968, 19,661 and 14,400 lb. per acre, nitrogen in the litter was 409, 377 and 227 lb. per acre, and nitrogen accumulation in the first 2 in. of mineral soil was 1,070, 1,066 and 989 lb. per acre and for the abandoned field 604 lb. Although porosity of the old-field Pine surface soil was only 7 per cent. greater than that of the adjacent abandoned field, its infiltration rate was about 700 per cent. greater.

11.47.2 : 12.25 : 12.26–8 : 11.44 : 11.42 : 11.41. AUTEN, J. T. **Black Locust, Pines, and Sassafras as builders of forest soil.** *Tech.*

Note cent. St. For. Exp. Sta. No. 32, 1941. pp. 9.

Of the species studied, including Black Locust, Shortleaf, Scots, Austrian, Eastern White and Red Pines, and Sassafras, the Pines were found to rank first in abundance of litter produced, Black Locust next, and Sassafras last. Sassafras litter became incorporated in the mineral soil to a greater degree than either Black Locust or Pine litter, Sassafras caused as great accumulation of total nitrogen in the upper mineral soil as Black Locust, and it proved superior to Black Locust in causing an increase in infiltration rates of rainfall. Black Locust plantings are likely to cause grass to develop on the forest floor unless they are underplanted with other trees species. *From author's summary.*

11.49. Soil Types

11.49 (52). KAWASHIMA, R., NAGATA, M., and SUYAMA, G. **The forest soil type in the north-east of Honshu, Japan.** *J. Sci. Soil Japan* 15, 1941 (28–42). [Jap.] S. & F. 4 (210).

11.49.4 : 11.42.34 : 22.11 (51). KAWASHIMA, R., and NAGATA, M. **On the regenerated brown forest soil in north-east Manchuria.** *J. agric. chem. Soc. Japan* 17, 1941 (10, 55–63). [Jap.e.] L.S.

Results of chemical analyses confirm the regeneration of a strongly podzolized brown forest soil under the long-continued influence of steppe-like conditions after deforestation. In spite of the preservation of the bleached layer the soil has almost lost its original podzolized character.

11.6. *Hydrographical Conditions. Water and Soil Conservation*

11.62 : 11.14.3 : 91.3. WICHT, C. L. **An approach to the study of rainfall interception by forest canopies.** *J. S. Afr. For. Ass.* 6, 1941 (54–70).

An interception experiment carried out in a stand of Poplars in Jonkershoek is described and the data obtained are used in a discussion of the experimental method and technique. It is pointed out that the method of paired stations inside and outside the forest is not entirely satisfactory and three improvements are suggested: (1) rainfall should be gauged above the canopy as well as in an adjacent open field, (2) all gauges should be sheltered from wind, and (3) the gauging technique used in the forest should be duplicated in the open and above the canopy.

Measurements of penetrations are analysed to test the accuracy of the sampling technique. It is shown that the variation in drip and direct penetration under various parts of the canopy is considerable. To obtain a mean estimation in the Poplar stand with a preselected standard error of 5 per cent., it is calculated that more than nineteen gauges would be required. A technique for measuring stem run-off was also tested and minor improvements are recommended.

Data of rainfall interception and penetration in the Poplar stand show that 32·27 in. of rain, or about 92·0 per cent. of downpour in the open, reached the forest floor. The penetration and interception varied greatly in amount and nature, according to whether the trees were in leaf or bare. Direct penetration and drip through trees in leaf was 79·7 per cent.; through bare trees 82·1 per cent. Stem run-off from trees in leaf was 6·1 per cent.; from bare trees 14·9 per cent. Interception by trees in leaf was 14·2 per cent.; by bare trees 3·0 per cent. *From author's summary.*

11.62.1 (922). GONGGRIJP, L. Het erosie-onderzoek. [**The erosion experiment.**] *Tectona* 34, 1941 (200–20). [Du.e.]

Experiments carried out near Tjiwidei, about 45 km. south of Bandoeng, Java, on volcanic soil at 1,800 m. altitude, showed that erosion was of little consequence during the first year after clearing virgin forest, amounting to only 0·17 kg./sq. m./year for terraced and 0·53 kg./sq. m./yr. for unterraced fields. This point is important in connexion with reforestation. Erosion increased progressively as the humus content of the soil decreased. As early as the second year after clearing it amounted to about 5 kg./sq. m./yr. from the unterraced fields as compared with about 2·5 kg./sq. m./yr. from the terraced ones, thus indicating the necessity for terracing in the absence of forest cover. These experiments are to be continued, and a further series has been started in Teak forest areas on erodible marly and black soils.

11.62.11 : 61. SEIGWORTH, K. J., and SNYDER, J. E. **Further notes on work unit erosion control surveys.** *J. For.* 39, 1941 (693–5). [Tennessee Valley Authority.]

With reference to work undertaken in the

Tennessee Valley. Sample data on erosion conditions and control requirements that were obtained in the earlier survey [cf. *For. Abs.* 1 (133)] have been combined into erosion classes and applied to an extensive area in eastern Tennessee for which they appeared to be suitable. A second survey method has been developed by which the whole survey area is divided into blocks of about 78,000 acres from each of which two sampling units of 1,100 acres are selected by the representative random sampling method. This is shown to have several advantages over the earlier method by which every acre of open land was inspected on six sample areas of 50,000 acres each.

11.62.22 : 11.48.7 : 23.3 : 91.3. SKORODUMOV, A. S. **The influence of forest plantations on the water-absorption rate of structureless ploughed soils.** *Lesnoe Khozyaystvo, Moscow* 1941 (3), (7–14). [R.] L.S.

Experiments in the Chernigov region in different forest stands aged up to 25 years, which had been planted on formerly ploughed, podzolized loess soils, showed that water penetration into the surface soil was slower than in comparable soils under agricultural crops. This confirmed similar observations previously made by several Russian workers.

11.62.22 : 43 : 34.21 : 11.44 : 11.41.3. AREND, J. L. **Infiltration rates of forest soils in the Missouri Ozarks as affected by woods burning and litter removal.** *J. For.* 39, 1941 (726–8). [Southern Forest Exp. Sta.]

A highly significant reduction in the water intake of seven different types of soil is shown to have followed the annual burning of the forest cover, composed of mixed upland Oaks, for 5 or 6 years, as compared with infiltration of unburned soils. The difference in infiltration rates of burned and unburned conditions varied from 20 to 62 per cent. for different soil types but was highly significant in all cases. The mechanical removal of the forest litter also caused a significant reduction in infiltration rate but not as great as that caused by burning, and did not effect such a wide variation between different soil types.

11.62.31 : 23.3. GROSSMAN, S. J. **Comments on 'Strip planting for flood control'.** *J. For.* 39, 1941 (728–30). [Allegheny Forest Exp. Sta.]

Criticism and queries on a number of points made in the original paper [cf. *For. Abs.* 2 (283)]. Observations are recorded that are a variance with statements made in the origina paper to the effect that crown closure in coniferous plantations reduces the extent of frozen ground and increases soil porosity.

11.62.31 : 91.3. UNITED STATES. **Annual report of the Allegheny Forest Experiment Station, 1940.** Philadelphia, Pa. [1941.] pp. 23.

In the Allegheny watershed it was found that while a larger quantity of water in the form of snow was stored under good forest cover than under poor cover or in the open, the daily contribution from melting snow to stream flow was 25 per cent. less from forested watersheds than from open lands, and the melting peak for forest land occurred several days after that for open land. Records from gauged watersheds indicate that with the same intensity of precipitation, peak flows from open land may be from 10 to 15 per cent. higher than those from forested areas (pp. 13–4).

12.1. *General Botany*

12.11. Physiology. Reproduction. Growth

12.11.1. *Metabolism. Plant Constituents. Sap Flow. Growth Substances. Reserve Materials*

12.11.1. MCDERMOTT, J. J. **The effect of the method of cutting on the moisture content of samples from tree branches.** *Amer. J. Bot.* 28, 1941 (506–8). [Duke University, Durham, N.C.] O.B.D.

A method of sampling twigs and branches of trees for moisture content, under conditions such that [water] tension exists in the xylem, is described. Samples from branches of 4 species of trees obtained by cutting both ends of the sample simultaneously had significantly higher moisture contents than adjacent samples from the same branch obtained by cutting one end 15–30 seconds later than the other. *From author's summary.*

12.11.11 : 12.26–8 : 12.14.7. YAICHNIKOV, I. S., and TARASIKOV, N. A. **Proteins of seeds of American Linden (*Tilia grandiflora* Ehrh.)** *J. appl. Chem. U.S.S.R.* 13, 1940 (1710–2). [R.f.] Chem. Abs. 35 (4062). P.R.

12.11.12 : 12.14.4. BEILMANN, A. P. **An attempt to record internal tree-trunk**

pressures. *Shade Tree* 13 (9), 1940 (6–7). E.S.R. 85 (173).

The experiments appeared to show that 'internal pressure' differing from atmospheric pressure does not occur in normal, sound trees.

12.11.12 : 31.1. EKAMBARAM, T., and KAMALAM, V. K. **Permeability of the wall of the xylem vessel.** *J. Indian bot. Soc.* 19, 1940 (231–4). [Presidency College Botanical Laboratory, Madras.] L.S.

Cut ends of shoots of *Tecoma stans* were placed in 10-per-cent. solutions of 24 different chemicals. As the solutions ascended into the shoot two types of killing of the living cells in the stem and leaves were observed:—(*a*) The acetic acid type, in which cells adjoining the xylem vessels in the stem and cells along the veins in the leaves were first killed. (*b*) The potassium nitrate type, in which the killing started in the groups of mesophyll cells at the vein endings. It is therefore inferred that the wall of the xylem vessel is not equally permeable to all the different solutes present in the transpiration stream, as is generally assumed. *From authors' summary.*

12.11.15 : 12.14.5 : 34.25. **Vitamin B_1 in buds of trees.** *Nature, Lond.* 148, 1941 (466).

In laboratory experiments heavy concentrations of vitamin B_1 were found in buds of Oak, Red Maple, Horse Chestnut, Elm, Sycamore and White Pine. The vitamin is apparently formed in the young leaves and growing points, whence it is transported to other parts of the trees. Basswood and Maple trees ringed in the spring showed almost no vitamin B_1 below the ring in midsummer, though large quantities were found above the ring; it is thus possible that vitamin starvation may contribute to the death of ringed trees. Sunlight and available mineral nutrients apparently influence the amount of the vitamin that the plants are able to produce. The discovery may offer a clue to the source of essential vitamins for many forest animals.

12.11.16 : 12.26–8 : 12.11.11. MCDERMOTT, J. J. **Changes in chemical composition of twigs and buds of Yellow Poplar during the dormant period.** *Plant Physiol.* 16, 1941 (415–8). [Duke University, Durham, N.C.] O.B.D.

Some of the chemical changes occurring in the buds and 1-year-old twigs of Yellow Poplar [*Liriodendron tulipifera*] during the winter, and on breaking of dormancy are reported. There was an apparent decrease in total nitrogen. During February and early March much of the protein was converted into more soluble compounds which were resynthesized into insoluble forms, probably proteins for the production of new protoplasm in the expanding buds. All of the carbohydrates appear to be used in respiration, starch and the sugars most readily, and the hemicelluloses least readily, if at all. With the resumption of photosynthetic activity starch appears, and the hemicelluloses are synthesized again. *Author's summary.*

12.11.2. *Propagation. Growth. Development*

12.11.21 : 12.26–8 : 34.27. MCKAY, J. W. **Male sterility in *Castanea*.** *Proc. Amer. Soc. hort. Sci. 1939*, 37, 1940 (509–10). [U.S. Horticultural Station, Beltsville, Md.] E.M.B.

Two cases are reported of male sterility due to failure of the stamens to develop. One of the trees is a *Castanea crenata* Sieb. and Zucc., the other a variety known as 'Mayseptjan'—probably a hybrid between *C. sativa* Mill. and *C. dentata* Borkh. Both trees have matured good crops of nuts, thus establishing the existence of cross-pollination. A tree of *C. sativa* is also suspected as possibly male-sterile. It is suggested that varieties may be discovered with pollen that will produce desirable nut characters when used on male-sterile trees.

12.11.21 : 12.26–8 : 23.23.1. PESCOTT, E. E. **Germination of the seed of Mallee Eucalypts.** *Victorian Naturalist* 58 (1), 1941 (8). O.R.S.

In spite of claims that seed of the Mallee Eucalypts does not germinate, this is not the case. Correspondents of a farmers' newspaper have reported that seedlings occur, and Dr. C. S. Sutton has been able to germinate the seed of 8 species. *Eucalyptus dumosa*, *E. leptophylla*, and *E. oleosa* germinated freely; a fair number of *E. gracilis*, *E. incrassata*, and *E. polybractea* seeds germinated; and a few seedlings of *E. uncinata* and *E. calycogona* appeared.

12.11.21 : 12.26–8 : 11.48 : 12.19.2 (66.9). NIGERIA. **Annual report on the forest administration of Nigeria for the year 1940.** Govt. Printer, Lagos. 1941. pp. 14.

The seed of *Isoberlinia doka* germinates rapidly on well drained loamy soil but fails to germinate on shallow sandy soils overlying clay where *Terminalia avicennioides* is found. This

may be the reason for the sharp division between these types (p. 4).

12.11.22 : 12.11.15. BUTTERFIELD, N. W., and McCLINTOCK, J. A. **New method of treating cuttings.** *Proc. Amer. Soc. hort. Sci. 1939*, 37, 1940 (1077–9). [Purdue University, Lafayette, Ind.] E.M.B.

Cuttings were treated under a vacuum of 29 in. of mercury to induce better penetration and distribution of growth substance. Comparative tests showed that whereas cuttings soaked by the ordinary method for 24 hours increased by 2–4 per cent. in weight, the weight of those undergoing vacuum treatment for 4 hours increased by 8–10 per cent. Experiments with a staining agent showed that penetration was increased from about $\frac{1}{8}$ in. to $\frac{1}{2}$–1 in. by the vacuum treatment. The vacuum treatment gave superior rooting in hardwood cuttings of Willow and Grape and in softwood cuttings of horticultural plants, and the subsequent growth of the plants was not inhibited by either this or the ordinary soaking treatment. The growth substance used was indolebutyric acid, the conditions for ordinary treatment being a concentration of 5 mg. per 100 c.c. distilled water and a period of 24 hours, while those for vacuum treatment were a concentration of 2·5 mg. per 100 c.c. (5 mg. per 100 c.c. produced injury under this treatment) and 4 hours for hardwood cuttings, and half this concentration and time for softwood cuttings.

12.11.22 : 12.11.15. WINKLEPLECK, R. L., and McCLINTOCK, J. A. **Lanolin emulsions as carriers of growth substances.** *Proc. Amer. Soc. hort. Sci. 1940*, 38, 1941 (94–6). [Purdue University, Lafayette, Ind.] E.M.B.

As a carrier for growth substances, lanolin alone has the advantage of adhesiveness, but spreads badly and thus gives an irregular coating on the surfaces treated. To combine adhesiveness and good spreading qualities the lanolin may be used as an emulsion, for which the following formula has proved satisfactory:—lanolin 38 g., stearic acid 7·5 g., triethanolamine 2·7 g., and distilled water 100 g. Instructions are given for the preparation of this emulsion and its application after the addition of the growth substance.

12.11.22 : 12.11.15. HITCHCOCK, A. E., and ZIMMERMAN, P. W. **Further tests with vitamin B_1 on established plants and on cuttings.** *Contr. Boyce Thompson Inst.* 12, 1941 (143–56).

Results of tests on established herbaceous plants and on cuttings of shrub species were variable and inconclusive, indicating that the use of vitamin B_1 on a practical scale should not be recommended until there is more substantial evidence of any benefits to be derived.

12.11.22 : 12.11.15. DOAK, B. W. **The effect of various nitrogenous compounds on the rooting of Rhododendron cuttings treated with α-naphthaleneacetic acid.** *N.Z. J. Sci. Tech.* 21, 1939–40 (336A–343A). [Plant Chemistry Laboratory, D.S.I.R., Palmerston North.] L.S.

(i) The effect of certain chemical compounds in association with α-naphthaleneacetic acid on the rooting response of *Rhododendron maddeni* var. *jenkinsii* has been demonstrated. (ii) All the chemicals tried, both inorganic and organic, were nitrogenous in nature and all had some beneficial effect on the rooting response. (iii) There appeared to be no correlation between the effectiveness of the compounds used and their chemical structure. (iv) Concentrations as low as 0·05 mg. per litre were quite effective. (v) It is suggested that the chemicals have a similar effect to the postulated 'rhizocaline'. *Author's summary.*

12.11.22 : 12.11.15. DOAK, B. W. **Changes in the carbohydrate and nitrogenous constituents of cuttings as affected by hormone treatment.** Part I. *N.Z. J. Sci. Tech.* 22, 1940–41 (192B–198B). L.S.

(i) A preliminary study of the effect of naphthaleneacetic acid on the rooting of cuttings of *Forsythia* has been made. (ii) Treated cuttings gradually accumulated more reducing sugars in the lower inch than controls, but this increase was at the expense of the amount of sucrose present. (iii) Very large increases in the amounts of amino-nitrogen and amide-nitrogen as a result of treatment were observed. (iv) It would appear that the chief effect of the hormone treatment is to accelerate the rate and intensity of a normal change in the metabolism of the cuttings. *Author's summary.* [Cf. preceding abstract.]

12.11.22 : 12.11.15. DOAK, B. W. **Changes in the carbohydrate and nitrogenous constituents of cuttings as affected by hormone treatment.** Part II. *N.Z. J. Sci. Tech.* 22, 1940–41 (198B–201B). L.S.

(i) Cuttings of *Rhododendron* sp. were treated with β-indolebutyric acid (1 in 10,000), α-naphthaleneacetic acid (1 in 10,000) α-naphthaleneacetic plus alloxan (naphthaleneacetic 1 in 10,000 plus alloxan 20 mg. per litre), and water only, for twenty-four hours. (ii) Bases of cuttings from each treatment were analysed at intervals for sugar and nitrogen fractions. (iii) α-naphthaleneacetic acid was more effective in mobilizing nitrogenous materials, with the exception of the non-protein nitrogen fraction, at the base of the cuttings than β-indolebutyric acid. (iv) β-indolebutyric acid exerted a greater effect on sugars than α-naphthaleneacetic acid. The addition of alloxan to the naphthaleneacetic acid increased the effect on sugars. *Author's summary.* [Cf. preceding abstracts.]

12.11.22 : 12.11.15. CHADWICK, L. C., and SWARTLEY, J. C. **Further studies on the effects of synthetic growth substances on cuttings and seeds.** *Proc. Amer. Soc. hort. Sci. 1940*, 38, 1941 (690–4). [Ohio State University, Columbus.] E.M.B.

A preliminary report on the effect of three proprietary preparations, with or without subsequent vitamin B_1 treatment, on cuttings of horticultural evergreens; and of synthetic growth substances on seeds of herbaceous and woody species.

12.11.22 : 12.11.15. MAXON, M. A., PICKETT, B. S., and RICHEY, H. W. **Effect of Hormodin A, a growth substance, on the rooting of cuttings.** *Res. Bull. Ia. agric. Exp. Sta.* No. 280, 1940. pp. 929–73.

The results are presented of an extensive series of experiments with Hormodin A on cuttings of various types from herbaceous, shrub, and tree species. The treatments, results, optimum concentrations, and type of cutting recommended are tabulated by species.

12.11.22 : 12.25. AUSTRALIA. **Annual report of the Commonwealth Forestry Bureau for year 1940.** Govt. Printer, Canberra. 1941. pp. 16.

Heating the soil by electric cables or hot-water pipes hastened root development in cuttings of *Pinus radiata*.

12.11.22 : 12.25 : 12.11.15. SNOW, A. G. **Effect of needle removal on survival of White Pine cuttings.** *Tech. Note Ntheast. For. Exp. Sta.* No. 38, 1941. pp. 2.

Experiments with 4-in. cuttings of current season's growth from the lower branches of a 20-year-old tree indicated that any form of leaf-area reduction resulted in excessive mortality. No cuttings survived clipping the top needles above the bud.

12.11.22 : 12.25 : 12.11.15. DORAN, W. L. **Propagation of Hemlock by cuttings.** *American Nurseryman* 74 (6), 1941 (18–9).

Cuttings of *Tsuga canadensis* were variously treated with growth substances and planted in a 2 : 1 sand/peat mixture, without bottom heat, in a greenhouse with an air temperature of about 70° F. Those taken from a very dwarf tree in late November and consisting of the last two years' wood gave 20 per cent. rooting of untreated controls in 9 months, whereas rooting of treated cuttings was mostly completed in 4 months. Indolebutyric acid at 200 mg./l. for 16 hours or 100 mg./l. for 24 hours gave 100 per cent. rooting in 14 weeks; at 50 mg./l. for 24 hours it gave 80 per cent. rooting. With Hormodin No. 3, 73 per cent. rooting was obtained. Cuttings taken in mid-January from another dwarf tree rooted more slowly and to a less extent than the November lot, and controls showed no rooting. For those consisting of the last year's wood only, the best rooting—87 per cent. in 20 weeks—was obtained with naphthaleneacetic acid at 50 mg./l. for 4 hours. For cuttings including wood of the last two years the best treatments were naphthaleneacetic acid at 100 mg./l. for 3 hours, with 73 per cent. rooting; indolebutyric acid at 200 mg./l. for 4 hours, with 67 per cent. rooting; and combined indolebutyric acid at 100 mg./l. and naphthaleneacetic acid at 50 mg./l. for 2 hours, with 80 per cent. rooting. Cuttings of the variety *pendula*, taken in early December and consisting of the current year's wood only, gave no rooting in untreated lots, 56 per cent. rooting in lots treated with naphthaleneacetic acid at 50 mg./l. for 16 hours, and decidedly poorer rooting with indolebutyric acid or Hormodin No. 3.

12.11.22 : 12.26–8. WETTSTEIN, W. VON. Die vegetative Vermehrung von Aspen (*Populus tremula*). [**The vegetative propagation of Aspens** (*P. tremula*).] *Züchter* 12 (4), 1940 (92–5). [G.] R.M.I.

A table is given to show the behaviour of root cuttings from F_2 seedlings of *Populus tremuloides* × *P. tremula* and from seedlings of *P. tremula*, *P. villosa*, *P. nigra*, *P. eugenei*, 'Maserpappel', *P. pyramidalis* and *P. canadensis*. The percentage of rooted cuttings varied

in the hybrids from 26 to 94, and there were also considerable differences in the degree of rooting. Of root cuttings taken from 3 different seedlings, half were placed vertically and half horizontally. Vertically placed root cuttings from 1-year-old seedlings rooted quickly and well. Rooting can be increased by transplanting twice, and the use of compost is recommended.

12.11.3. *Heredity. Breeding. Hybridization. Races and Questions of Provenance*

12.11.3 : 12.25. ALBENSKY, A. V. **Specific characters in F_1 of interspecific *Larix* hybrids.** *Proc. Lenin Acad. Agric. Sci. U.S.S.R.* 1940 (23/24), (20–3). [R.] C.G.B.

Hybrids of *Larix decidua* × *L. kaempferi* Sarg. at the age of 5 years showed considerable heterosis; 55·2 per cent. were between 150 and 200 cm. in height and a further 10·4 per cent. exceeded 200 cm. The same was true of hybrids of *L. sibirica* Ledeb. × *L. kaempferi*, where the figures were 48·7 per cent. and 21·0 per cent. respectively. Of the 8 corresponding seedlings of *L. decidua* only 1 was as high as 176 cm. and the others were considerably smaller. The trunk was quite straight in the majority of the hybrids of *L. sibirica* × *L. kaempferi*, whereas in the other cross half the hybrids had bent trunks. The crown was classed as wide in the majority of the hybrids and the replacement of the main axis by lateral axes when killed was in most hybrids satisfactory.

The purple colour of the annual shoots of *L. kaempferi* was dominant in all but about 15 per cent. of the hybrids. The shoots were pubescent in almost all hybrids. In the hybrids of *L. decidua* the needles were green in 20·6 per cent. of the hybrids, grey in 75 per cent. and intermediate in 4·4 per cent. In the *L. sibirica* cross the figures were 19·5 : 71·4 : 9·1 per cent.

The characters of the paternal species *L. kaempferi* that predominate in the hybrids are thus the wide crown, the colour of the young shoots and the grey colour of the needles. Other characters of this species, such as the susceptibility of the young shoots to frost damage and the formation of an umbrella-like crown owing to the dying off of the main-shoot and the failure of the lateral shoots to replace it, appeared in certain of the hybrids but were by no means dominant.

12.11.3 : 12.25. UNITED STATES. **Forest research: 1940. Pacific Northwest Forest and Range Experiment Station.** Portland. Oregon. [1941.] pp. 26.

Trees grown in experimental plantations from seed of different regional strains of Ponderosa Pine show marked differences in size and vigour (p. 17).

12.11.3 : 12.25 : 31.2. TIEBE, H. Raumgewicht und Druckfestigkeit des Holzes verschiedener Kiefernrassen aus der Tharandter Provenienzfläche. **[Specific gravity and crushing strength of the wood of various Scots Pine races from the Tharandt provenance plot.]** *Thar. forstl. Jb.* 91, 1940 (1–78). [G.] R.M.I.

The races studied were derived from Scotland, France, Belgium, the Palatinate, Brandenburg, East Prussia, Kurland, and Perm. Except for the Brandenburg and Perm races, of which only two stems were investigated, four stems of each race were tested. Frequency curves for specific gravity were constructed for a large number of samples, and it was shown that the curves for individual stems were mostly the same or at least similar within a race and differed from those of other races. The occurrence is noted of two sub-races in the material of Scotch and Belgian provenance. Specific gravity was shown to be a function of the assimilation capacity of the crown. Heavy and light stems were found within each race. Wood from the French and Belgian (*a*) trees was the heaviest and varied little within individual stems; that from the Brandenburg, Belgian (*b*), Scotch, and East Prussian races was medium heavy, but varied within individual stems; that from the Perm race was also of medium weight, but varied less; and that from the Kurland and Perm races was the lightest and varied little. The investigation showed that the difference in the specific gravity of wood from individual stems is not traceable to the influence of the habitat. Comparison of figures for crushing strength indicated that in spite of individual variation there were considerable differences between the races in this respect also.

12.11.3 : 12.26–8. PETCUŢ, M., and RADULESCU, A. V. Varietaţi şi forme noi le *Fraxinus pallisae* Wilmot. **[Varieties and forms in *Fraxinus pallisae* Wilmot.]** *An. Inst. Cerc. Exp. For. Bucareşti* 6, 1941 (109–21). [Rum.g.] Pl. Sci. Lit. 14 (4), (3).

12.19. Geographical Distribution. Plant Geography and Sociology

12.19 (469). GONÇALVES DA CUNHA, A., and GONÇALVES SOBRINHO, L. Quelques remarques sur la distribution de la végétation dans l'Archipel des Açôres. **[Notes on the distribution of the vegetation of the Azores.]** *Bol. Soc. broter.* 14 (Ser. 2), 1940 (1–16). [F.f.]

12.19 (469). TABORDA DE MORAIS, A. Novas áreas da fitogeografia portuguesa. **[New areas in Portuguese plant geography.]** *Bol. Soc. broter.* 14 (Ser. 2), 1940 (97–138). [Port.]

Recent data are given on the distribution of 42 species and varieties including several forest trees, chiefly of the genera *Pinus* and *Quercus*.

12.19 : 12.25 (74.1). NEAL, O. M. **The status of *Chamaecyparis thyoides* in Maine.** *Rhodora* 42, 1940 (343–4). O.B.D.

Only four stands of *Cupressus* (*Chamaecyparis*) *thyoides* are at present known to occur in Maine.

12.19 : 12.26–8 (91.4). MENDOZ D. R. **Natural distribution of Durians [*Durio* spp.] in the Philippines.** *Philipp. J. For.* 4, 1941 (27–35). [Bureau of Forestry, Philippines.]

12.19: 12.26–8 (498): 42.21: 42.31. GEORGESCU, C. C. Considerațiuni asupra răspândirei cerului şi efectele gerurilor în cereturi. **[Observations on the distribution of the Turkey Oak and on the effect of frosts in Turkey Oak forests.]** *Rev. Pădurilor* 53, 1941 (197–204). [Rum.g.] L.S.

An account is given of the distribution of *Quercus cerris* and *Q. farnetto* forests in Rumania. *Q. cerris* is characteristic of depressions at elevations up to 140 m. above sea level, growing on compact soils that are relatively impermeable to water. Such soils are liable to protracted flooding when the snow melts and to desiccation in periods of drought. Freezing and thawing of the floodwater caused frost wounds on the trees in the spring of 1940. Forests of *Q. farnetto* occur at elevations of 140–240 m. above sea level, on clayey, very compact soils of very low lime content.

12.19.1. *Regional Floras*

12.19.1 (54.1). KANJILAL, U. N., DAS, A., KANJILAL, P. C., and DE, R. N. **Flora of Assam. Vol. III. Caprifoliaceae to Plantaginaceae.** Prabasi Press, Calcutta. 1939. pp. x + 578.

12.19.1 (54.1). KANJILAL, U. N., KANJILAL, P. C., DE, R. N., and DAS, A. **Flora of Assam. Vol. IV. Nyctaginaceae to Cycadaceae.** Prabasi Press, Calcutta. 1940. pp. ix + 377.

12.19.1 (54.1). BOR, N. L. **Flora of Assam. Vol. V. Gramineae.** Prabasi Press, Calcutta. 1940. pp. 480.

12.19.1 (54.2). RAIZADA, M. B. **New or little known plants from Kumaon.** *Indian For.* 67, 1941 (15–23). [Forest Research Institute, Dehra Dun.]

An annotated list of plants not previously recorded from this region.

12.19.1 (729.7). WILLIAMS, R. O., and WILLIAMS, R. O., jun. **The useful and ornamental plants in Trinidad and Tobago.** Govt. Printer, Trinidad and Tobago. 3rd (revised) ed., 1941. pp. 265.

This guide is prefaced with lists in which the useful plants are grouped in alphabetical order under broad categories such as plantation crops, forest crops, garden crops, etc., while the ornamental plants are keyed out by the characters that are most obvious to the non-botanical enquirer, such as stature, flower colour, etc. The main body of the work is alphabetically arranged by the individual plant names, both common and botanical; under the latter are included short accounts of the appearance and uses of the plants, and cross-references to these are given for each common name. There is also an alphabetical list of the families and genera represented, and a short section on the culture of food crops in gardens.

12.19.1 (73 : 71) : 12.2. HARLOW, W. M., and HARRAR, E. S. **Textbook of dendrology. Covering the important forest trees of the United States and Canada.** McGraw-Hill Book Company, Inc., New York & London. 2nd ed., 1941. pp. 542.

This volume can be confidently recommended as an introduction to the study of American trees. The main changes in the second edition are (i) the addition of range maps of the more important species, and (ii) tables instead of paragraphs of distinguishing characteristics for groups of these species. This second innovation makes for greater clarity and convenience, as the essential points can be seen at a glance.

The introduction contains a good, clear explanation of the fundamentals of nomenclature, classification and identification, followed by an equally clear description of leaves, flowers, fruits, twigs, etc., and their variation. These are largely correct, and should be easily understood by the student. A point very rightly stressed by the authors is that in a book of this kind, non-diagnostic characters of species are a waste of space and energy. At the same time the relationship of the species to its habitat and associates is not forgotten.

The main body of the book consists of a systematic description of groups (subdivisions), orders, families and genera, with diagnostic descriptions of the species of greatest importance to forestry. For instance, the general characteristics of the Coniferales are followed by a conspectus of coniferous families, a conspectus of native genera in Pinaceae, and botanical features of the genera and more important species. Since this is not a flora, and does not include all the species, the authors prefer not to use keys, which are apt to obscure the really fundamental characters.

The most obvious and useful feature of the book from the student's point of view is the wealth of excellent illustrations. Each description of the more important species is accompanied by a half-tone photographic plate, showing essential characters of leaf, flower, fruit and often bark. A. C. H.

12.19.1 (76.6). PHILLIPS, G. R., GIBBS, F. J., and MATTOON, W. R. **Forest trees of Oklahoma: how to know them.** *Oklahoma Planning & Resources Board, Division of Forestry*, No. 1 (Ed. 5) 1939. pp. 135.

12.19.2. *Forest Types*

12.19.2 (43.1–5). RUBNER, K. Die Waldgesellschaften einiger deutscher Mittelgebirge. Zugleich eine Besprechung des Buches von J. und M. Bartsch: 'Vegetationskunde des Schwarzwaldes'. [**The forest communities of some of the central mountain ranges of Germany. Including a review of the book 'Ecology of the Schwarzwald', by J. and M. Bartsch.**] *Thar. forstl. Jb.* 91, 1940 (453–65). [G.] R.M.I.

12.19.2 (729.6) : 12.19.4. STEHLÉ, H. Conditions éco-sociologiques et évolution des forêts des Antilles Françaises. [**'Eco-sociological' conditions and evolution of the forests of the French Antilles.**] *Carib. For.* 2, 1941 (154–9). [F.e.span.]

Notes on the prevailing forest climax types, viz. the xerophytic forest, the mesophytic forest, the hygrophytic or rain forest, and the mountain woodland. The regressive evolution of these types due to the action of soil deterioration, hurricanes, cyclones, and the activities of man are discussed and notes given on the composition of the more common substitute formations.

12.19.2 (74.8–75.2) : 12.26–8 : 11.33–4. UNITED STATES. **Annual report of the Allegheny Forest Experiment Station, 1940.** Philadelphia, Pa. [1941.] pp. 23.

Topography and aspect have a definite influence on the species composition of the northern hardwoods type over the Allegheny Plateau, particularly where the slopes are steep. Sugar Maple is more prevalent on the upper and middle slopes and on east and south-east slopes, Yellow Birch and Red Maple on the Plateau and slower slopes, Red Maple and Black Cherry on the north to north-east and south to south-east slopes, and Beech on the west and north-west slopes (p. 5).

12.19.2 (78.3) : 12.19.3 : 12.19.4 : 42.22. TOLSTEAD, W. L. **Plant communities and secondary succession in south-central South Dakota.** *Ecology* 22, 1941 (322–8). [University of Nebraska.]

Prairie communities are the major climax types in the region described, and tree communities occur only in special habitats. *Pinus scopulorum* is found on limy sandstone outcrops on the edges of valleys, and deciduous woodlands of *Populus sargentii, Fraxinus pennsylvanica, F. lanceolata, Ulmus americana, Celtis occidentalis, Salix amygdaloides, Acer negundo, Quercus macrocarpa*, and *Juniperus virginiana* occur in the valleys. In 1936 and 1937, drought destroyed 75–85 per cent. of the deciduous trees in ravines with silt-loam soils where permanent ground water was not accessible, but trees and shrubs near springs or streams did not suffer materially. The communities of *Pinus scopulorum* did not suffer losses from drought.

12.19.2 (79.1) : 12.19.3 : 13.15. RASMUSSEN, D. I. **Biotic communities of Kaibab Plateau, Arizona.** *Ecol. Monogr.* 11, 1941 (229–75). [University of Illinois.]

A detailed account is given of this area, with special reference to animal ecology. The four

major biotic communities of the plateau proper are:—(i) the *Picea/Abies/Sciurus fremonti* association of the montane forest climax between 8,200 ft. and the summit of 9,200 ft.; (ii) the *Pinus brachyptera/Sciurus kaibabensis* association of the montane forest climax between 6,800 and 8,200 ft.; (iii) the *Pinus/Juniperus/Neotoma* association of the woodland climax between 5,500 and 6,800 ft.; and (iv) the *Stipa/Carex/Thomomys* associes, consisting of small areas of mountain grassland above 7,800 ft. On the basis of animal ecology there are major differences between the Piñon/Juniper woodland and the montane forests, but only minor differences between the latter.

12.19.4. *Succession*

12.19.4 (77.5). CHAVANNES, E. **Written records of forest succession.** *Sci. Mon., N.Y.* 53, 1941 (76–80). [University of Wisconsin.] L.S.

A general discussion, illustrated by maps, of evidence from place names, surveyors' maps, and old documents, which shows that the forest has made substantial encroachments upon the prairie in southern Wisconsin. The advance of the forest is attributed largely to the cessation of recurrent prairie fires set by the Indians.

12.19.4 (79.6). EGGLER, W. A. **Primary succession on volcanic deposits in southern Idaho.** *Ecol. Monogr.* 11, 1941 (277–98). [University of Minnesota.]

An account is given of successions on 'pahoehoe' (relatively smooth, ropy or billowy lava flow) and on cinder cones, and brief consideration is given to 'aa' (broken, jagged) lava flows with particular reference to the occurrence of *Pinus flexilis*. On 'pahoehoe', the ultimate vegetation of which is the regional grass/sage climax, this species occurs sparingly in a depauperated state; but on certain 'aa' flows there occur stands of larger and more numerous trees with better reproduction, their occurrence and distribution appearing to be related to the increased water supply and increased protection afforded by the depressions. Tree communities are also found on the cinder cones, mostly on the slopes facing north, and on these sites they are slowly extending their range. The species concerned are *Pinus flexilis*, *Populus tremuloides*, and *Pseudotsuga taxifolia*.

12.2. *Special [Systematic] Botany*

12.21. Fungi

12.21. BONDARTZEFF, A., and SINGER, R. Zur Systematik der Polyporaceen. **[On the taxonomy of the Polyporaceae.]** *Ann. mycol., Berl.* 39, 1941 (43–65). R.A.M. 20 (382).

The authors present their classification of the Polyporaceae *sensu lato*. Full recognition is given to characters derived from micro-anatomy and cell chemistry. Diagnoses of the new genera are not given, but are expected to appear shortly in *Sovetskaya Botanika*.

12.21 : 31.42.11. PILÁT, A. Revision der Gattung *Lentinus* Fr. aus dem Herbar des Naturhistoriska Riksmuseet in Stockholm. **[Revision of the genus *Lentinus* Fr. from the herbarium of the State Natural History Museum in Stockholm.]** *Ann. mycol., Berl.* 39, 1941 (71–103). R.A.M. 20 (381).

A critically annotated list is given of 106 species of *Lentinus* represented in this herbarium, including one new species, *L. samarensis* on wood in the Philippines, and six new varieties. Three recently described genera—*Lentinopanus*, *Lentinellus*, and *Lentinaria*—accommodate species now excluded from the genus *Lentinus* in its emended interpretation.

12.25. Gymnosperms

12.25. REHDER, A. ***Abies procera*, a new name for *A. nobilis* Lindl.** *Rhodora* 42, 1940 (522–4). [Arnold Arboretum, Harvard University.] O.B.D.

Owing to the discovery of an older homonym, the name *Abies nobilis* (Dougl. and Lamb.) Lindl. becomes invalid and is here changed to *A. procera* Rehder nom. nov.

12.25. WARD, F. K. ***Pinus armandi.*** *Gard. Chron., Lond.* Ser. 3, 109, 1941 (112). O.B.D.

A brief description of the tree and record of its discovery in northern Burma and Tibet.

12.25 (56.43). COUPPIS, T. **Notes on the Pines in Cyprus.** *Forest Treasures, Nicosia* 2 (3; 4), 1940 (23–8; 23–4).

Description, distribution, uses and silvicultural characteristics of the five species of Pine now growing in Cyprus. These are Aleppo Pine (*Pinus halepensis*), Troodos Pine (*P. laricio*), Stone Pine (*P. pinea*), Canary Pine (*P. canariensis*) and Monterey Pine (*P. radiata*).

The first two species are indigenous and the last three exotic.

12.25. HUNTER, W. **The Mountain Plum Pine of Goonmirk, East Gippsland.** *Victorian Naturalist* 58 (1), 1941 (9–10). O.R.S.

Brief notes on *Podocarpus alpina* R. Br., a small tree up to 20 or 25 ft. high and 1 ft. basal diameter. The figure of this species in Ewart's 'Handbook of Forest Trees for Victorian Foresters' is said to be misleading as to the flowers, and an emended figure is given.

12.26.8. Dicotyledons

12.26–8 (81). DUCKE, A. As Leguminosas da Amazônia Brasileira. **[The Leguminosae of Brazilian Amazonia.]** Serv. Florestal, Min. Agr., Rio de Janeiro. 1939. pp. 171. E.S.R. 84 (741).

12.26–8 (8). MOLDENKE, H. N. **New South American Verbenaceae.** *Phytologia* 1 (15), 1941 (483–90). Biol. Abs. 15 (15345).

12.26–8 (72). LUNDELL, C. L. **Three new trees from Tabasco and Campeche.** *Phytologia* 1 (15), 1941 (481–2). Biol. Abs. 15 (15343).

One new species of *Pithecolobium* and two of *Eugenia*.

12.26–8 (72 : 728). LUNDELL, C. L. **Noteworthy spermatophytes from Mexico and Central America.** *Phytologia* 1 (14), 1940 (449–53). Biol. Abs. 15 (15342).

New species in *Croton* and *Perrottetia* and a new name in the latter.

12.26–8 (68). COLLETT, D. G. **The South African species of *Erythrina*.** *Bothalia* 4, 1941 (219–28).

The genus and the South African species are described and a key to the latter is provided.

12.26–8. COOK, O. F. **Naming the cultivated Rubber Tree *Siphonia ridleyana*.** *J. Wash. Acad. Sci.* 31, 1941 (46–65). [Bureau of Plant Industry, U.S.D.A.] L.S.

The nomenclature of this species, generally known as *Hevea brasiliensis*, is discussed, and it is concluded that the generic name *Hevea* should be dropped in favour of *Siphonia*. The specific epithet *ridleyana* is proposed in honour of H. N. Ridley, whose pioneer work on tapping methods made possible the commercial cultivation of the tree.

12.26–8 (75.8) : 12.19. BISHOP, G. N., and DUNCAN, W. H. **A new White Oak from Georgia: its associates and habitat.** *J. For.* 39, 1941 (730–1). [University of Georgia.]

A brief note on the general characteristics, habitat, and associates of a new species of Oak (*Quercus oglethorpensis*) recently found in north-east Georgia, where its distribution is restricted to an area about fifteen miles in radius. The tree is recognized by its silvery grey bark and entire leaves. Its wood closely resembles that of *Quercus alba*. [Cf. *For. Abs.* 3 (37).]

12.26–8. JARAMILLO, R. Monografias botánicas: el samán. **[Botanical monographs: *Samanea saman*.]** *An. Univ. Antioquia* 37, 1940 (105–9). Biol. Abs. 15 (15340).

Including complete synonymy, list of vernacular names, description, geographic distribution, and notes on relationships.

13.1. *General Zoology*

13.13 : 13.2. JOHANNSEN, O. A., and BUTT, F. H. **Embryology of insects and myriapods.** McGraw-Hill Book Co., New York and London. 1941. pp. 462.

13.14 : 13.2. MAKHOTIN, A. Regressive Züge im Bau der Weibchen des grossen Frostspanners (*Erannis defoliaria* Cl.) und des kleinen Frostspanners (*Operophthera brumata* L.). **[Regressive features in the structure of the females of *Erannis defoliaria* and *Operophthera brumata*.]** Zu den Erscheinungen der Reduktion in der Morphologie der Imagines des grossen Frostspanners (*Erannis defoliaria* Cl.). **[On reduction phenomena in the morphology of the imagines of *Erannis defoliaria*.]** *C. R. Acad. Sci. U.R.S.S.* 28, 1940 (367–70; 760–3). [G.] I.I.E.

Discussion of morphological features in relation to their evolution.

13.2. *Special [Systematic] Zoology*

13.2. GÄBLER, H. Unterschiede der Spiegelraupen der Nonne (*Lymantria monacha* L.) und des Schwammspinners (*Porthetria dispar* L.). **[Distinctions between the first-instar larvae of the nun moth (*Lymantria monacha*) and the gypsy moth (*Porthetria dispar*).]** *Forstwiss. Cbl.* 63, 1941 (110–2). [G.] [Forschungsstelle für Nonnenbekämpfung der Sächs. Forstl. Versuchsanstalt Tharandt.]

2. SILVICULTURE

2 : 12.26–8 : 33.0 : 11.47.2 : 11.44. HEDEMAN-GADE, E. Ökad björkproduktion—en beredskapsåtgärd. **[Increased Birch production—a measure for security.]** *Skogen* 28, 1941 (153–6). [Sw.] L.S.

2 : 12.26–8 : 33.0 : 11.47.2 : 11.44. NORDFORS, G. Bränsleavverkningarna, björken och framtiden. **[The fuelwood fellings, Birch and the future.]** *Skogen* 28, 1941 (129–31). [Sw.] L.S.

Both of these papers plead for greater attention to the silviculture of Birch, the value of which has been much increased by recognition of its utility as a fuelwood, especially for producer-gas vehicles, as a raw material for skis and veneers, and as a soil improver in mixed stands. The chief desiderata are proper care in thinning, the provision of adequate seedbearers when final fellings are made, and protection of the young growth from grazing animals. [Cf. *For. Abs.* 3 (118).]

21. SILVICULTURAL CHARACTERS OF TREE SPECIES

21.0. *Adaptability to the General Environment. Acclimatization*

21.0 : 12.25 : 12.26–8 : 56 (67.8). TANGANYIKA. **The twentieth annual report of the Forest Department, Tanganyika Territory, 1940.** Govt. Printer, Dar es Salaam. 1941. pp. 7.

Growth studies in the Southern Highlands of Tanganyika show that, of the Eucalypt species, *E. regnans*, *E. globulus*, and *E. maidenii* have the best height growth and that *Pinus patula* is the most promising species of the coniferous group (p. 6).

21.0 : 12.25 : 57.0 (74.7). COOK, D. B. **Notes on a Larch plantation.** *J. For.* 39, 1941 (647). [New York State Conservation Department.]

Results after ten years from a small plantation of 2–0 European Larch, planted at 6 × 6 ft. spacing on an abandoned pasture of stony loam soil, moderate slope and 1,400 ft. elevation in New York, indicated extremely good growing conditions for this species despite two years with early frosts, two dry summers and attacks from insect pests. Sample-plot measurements are given in some detail and show an average d.b.h. of 3·1 in. at ten years and an average height of 20·8 ft. (max. 30·5 ft.).

21.0 : 12.25 : 57.0 : 11.49.1. SERGEEV, P. N. **The growth of *Larix sibirica* on chernozems of the steppe.** *Lesnoe Khozyaystvo, Moscow* 1941 (4), (31–4). [R.] L.S.

In a small 70-year-old stand in the Kuibyshev State forest reserve (deep chernozem soil; vegetation period 5th May to 5th November; absolute maximum temperature 40° C.; absolute minimum temperature –40° C.; annual rainfall 475 mm., of which up to 64 per cent. falls during the vegetation period) the volume per ha. of Siberian Larch amounted to 690 cu. m. over bark and 645 cu. m. under bark, and the total over-bark standing volume, including that of the understorey composed of different broadleaved trees, was 717 cu. m. per ha. The mean annual increment per ha. of the acclimatized Larch was thus about twice as high as that of Oak native to this site. The Larch trees were very straight and perfectly healthy.

21.0 : 12.26–8 : 57.0 : 23.2 (59.5). DURANT, C. L. ***Gmelina arborea* in Malaya.** *Malay. For.* 10, 1941 (89–92).

Growth figures and silvicultural data are given for experimental plantations of Yemane (*Gmelina arborea*) in Malaya, and the possibilities of its use on a large scale are discussed. The species is capable of great volume production in a short space of time, e.g. after allowing two-thirds of the total volume for small wood there should still be 700 cu ft., under bark, per acre of round exploitable timber after a rotation of only 10 years. The wood could become valuable for match manufacture and for light constructional timber; though, in contrast to experience with Indian-grown Yemane, the Malayan material appears to be non-durable and liable to termite attack. *G. arborea* seems to be somewhat exacting in soil requirements, and it is useless to try to establish it on sand, laterite, or poorly drained soils in Malaya. Friable soils and well drained alluvium free from flooding are likely to provide the most suitable sites. As cultivation round the base of the plants during early life is necessary for good establishment, the species should be particularly suitable for *taungya* plantings. Its most useful role in Malaya is likely to be that of a saleable nurse for more valuable species; for Malayan soils are generally poor and might be incapable of growing more than one crop of a tree with such rapid growth.

21.0 : 12.26–8 : 23.3 : 23.21. BRUNER, M. H. **Let's proceed slowly.** *J. For.* 39, 1941 (651). [Clemson College Extension Service.]

A warning against the too rapid expansion of the range of Shipmast Locust beyond its native habitat without adequate preliminary investigation. The failure of Black Locust plantations in the Southern States is noted in this connexion.

21.2. *Moisture Requirements. Water Régime*

21.2 : 12.26–8 : 21.12 : 12.11.3 : 12.11.1. PYATNITSKI, S. S. **The ecological types of Common Oak and their utilization in silvicultural practice.** *Lesnoe Khozyaystvo, Moscow* 1941 (3), (14–23). [R.] L.S.

Three ecological types of *Quercus robur* may be distinguished in the Russian forest-steppe regions:—var. *tardiflora*, which grows in ravines and is resistant to late frosts; a form of var. *praecox* that grows on plateaux and watersheds and at higher elevations generally, and is less frost- but more drought-resistant than *tardiflora*; and a second form of *praecox* that occupies broad river valleys, which is also sensitive to frost, and, in addition, less drought-resistant than either of the first two types. Pot experiments with seed of *tardiflora* and of *praecox* from the higher elevations in the Kharkov region showed that the latter type wilted more slowly and exhibited greater photosynthetic activity under drought conditions than the former; that photosynthesis had its optimum at 16–17 per cent. and over 20 per cent. soil moisture for *praecox* and *tardiflora*, respectively; and that, compared with *tardiflora*, the *praecox* type transpired less water and formed a greater weight of dry matter per unit volume of water transpired during the vegetation period as a whole and especially during drought. In future plantation work, a more rigorous segregation of the seed of the three ecological types should be practised than has been done in the past.

21.8. *Phenology*

21.8 (74.9). LITTLE, S. **Calendar of seasonal aspects for New Jersey forest trees.** *For. Leaves* 31 (4), 1941 (1–2, 13–4). [Allegheny Forest Exp. Sta.]

Observations are recorded of the vegetative and reproductive activities of a number of upland and swamp species over a period of three years, and of the influence of exposure and frost on these activities.

21.8 : 11.11.2. UNITED STATES. **Annual report of the Allegheny Forest Experiment Station, 1940.** Philadelphia, Pa. [1941.] pp. 23.

Analysis of weather records for a 7-year period from three stations within a mile of each other showed that the growing season in a frost pocket averages 20–40 days shorter than that on adjoining upland or in virgin forest (p. 5).

21.8 : 12.25 : 12.14.4. POHL, F. Über antizipierte Seitenachsen bei *Larix decidua* Mill. **[On 'anticipated' lateral shoots in *Larix decidua*.]** *Forstwiss. Cbl.* 63, 1941 (67–9). [G.]

On a number of trees of different ages, growing near Prague, the author observed the formation of lateral shoots on shoots of the same growing season, both on the leader and the branches; moreover, the anticipated lateral shoots appeared to have developed into long shoots without passing through the short-shoot stage, since their bases showed no sign of compression wood or of a needle cluster. This unusual phenomenon, which occurred during the 1938 and 1939 growing seasons, is as yet unexplained.

21.8 : 12.26–8. BROWN, C. S. **The use of the term 'deciduous' as applied to tropical forests.** *Emp. For. J.* 20, 1941 (63).

In the experience of the writer the leaf-bare period for *Cedrela mexicana* in northern British Honduras is during the actual dry season whether this is of short or long duration. [Cf. *For. Abs.* 1 (223), 2 (288).]

21.8 : 56.01 : 12.25 : 11.21. COOK, D. B. **Five seasons' growth of conifers.** *Ecology* 22, 1941 (285–96). [New York State Conservation Department, Albany.]

During 1933–37 a study was made in Rensselaer County, New York, of the phenology and growth of certain native and exotic conifers, the species being Red Pine, American and European Larch, Red, White and Norway Spruce, and Hemlock. Measurements were made on one young tree of each species, mostly less than 3 ft. high at the start. The commencement of growth varied from May 4 for Red Pine to June 3 for Red Spruce. The growing period was 50–60 days for Pine and Spruce, 85 for Hemlock, and almost 100 for Larch. Red Pine completed its growth before July 1,

while the Larches continued into September. The pattern of the several growth curves was quite constant from year to year and appears to be specific. Exceptional deficiency in rainfall appeared to retard growth. Unseasonably low temperatures after growth started may have been the cause of temporary slackening. Normal weather fluctuations, however, appear to have had but little influence. Norway and White Spruce have a decidedly different growth pattern from Red Spruce, for which they are often substituted in reforestation projects. All species proved hardy to the most severe winter on record, that of 1933–4. *From author's summary.*

21.8 : 56.01 : 12.25 : 12.11.23. FOWELLS, H. A. **The period of seasonal growth of Ponderosa Pine and associated species.** *J. For.* 39, 1941 (601–8). [California Forest & Range Exp. Sta.]

A comparison of the seasonal height growth of six conifers (Ponderosa Pine, Sugar Pine, Lodgepole Pine, Jeffrey Pine, White Fir and California Incense Cedar (*Libocedrus decurrens*)) over a period of 8 years has revealed differences in time of start of growth, length of growing period, and the minimum number of days required to complete 50 per cent. of the growth. The first species to start growth was Lodgepole Pine and the last was White Fir. White Fir had the shortest growing period and Incense Cedar the longest. Sugar Pine required the least number of days to complete 50 per cent. of its growth and Incense Cedar the most. A comparison of the seasonal radial growth of four conifers revealed that White Fir was the last to start seasonal growth and had the shortest growing period.

Height growth of Ponderosa Pine started very significantly later with each rise of 2,000 ft. in elevation. The length of the growing period was shortened significantly with an increase of 3,000 ft. in elevation. Radial growth of Ponderosa Pine started significantly later with an increase of 2,000 ft. in elevation. The rate of height and radial growth of Ponderosa Pine during the grand period of growth did not vary with elevation. Needles of the Pines did not emerge from the fascicle sheath until 50 per cent. or more of the growth had occurred. Because of the differences apparent in the period of seasonal growth among species, among areas, and from year to year, the use of calendar years without regard to the period of seasonal growth in the calculation of average annual growth in short time studies may give biased results. *Author's summary.*

21.8 : 56.01 : 12.26–8. KIENHOLZ, R. **Seasonal course of height growth in some hardwoods in Connecticut.** *Ecology* 22, 1941 (249–58). [Connecticut State Forest Service.]

Measurements were made during 4 growing seasons of the seasonal course of height growth in trees and sprouts of a number of hardwood species. Most of the species started height growth late in April or very early in May. Height growth in White Ash rose rapidly to a peak in late May and ceased in late June, a total growing period of 60 days; 90 per cent. of this growth occurred in 30 days, May 10 to June 10; Red Oak, Beech, and Sugar Maple had a similar course of growth. Height growth in Gray and White Birch reached a peak in mid-June and ceased in mid-August, a growing period of 110 days; 90 per cent. of this growth occurred in 60 days, May 20 to July 20; Tulip and Aspen had a similar course of growth. Red Maple had a course of growth about mid-way between these two extremes. The growth curve of Red Pine was similar to that of Red Maple, while that of European Larch was similar to, but later than that of Gray Birch. The curve of growth for any given species was similar from year to year, especially the time of reaching the peak of most rapid growth. First-year stump sprouts started growth later, reached a peak later, and ceased growth much later than shoots of young but mature trees. Secondary height growth was pronounced in some species and during some years. Summer drought caused a slowing down of growth in first-year sprouts. Rains caused a resumption of growth if they did not come too late in the season. *From author's summary.*

21.8 : 56.02 : 12.26–8 : 12.11.23 : 12.11.6 : 11.11 : 11.14. FRIESNER, R. C. **A preliminary study of growth in the Beech, *Fagus grandifolia*, by the dendrographic method.** *Butler Univ. bot. Stud.* 5, 1941 (85–94). L.S.

(i) Radial and diametral changes have been studied with dendrometers and dendrograph on 3 trees of *Fagus grandifolia*. (ii) Growth changes were first noted coincident with the time when leaves attained full expansion, this

occurring in 1940 about the middle of May. (iii) Radial increases rose steadily to maximal rates which occurred in all 3 trees during the week ending June 17. (iv) Radial increases steadily declined in rate, reaching the zero point shortly after July 15. (v) Radial losses due to reduced turgidity resulting from excess of transpiration over ability of roots to supply water occurred from July 15 to August 12. Weekly periods following this date showed alternating losses and recoveries closely correlated with rainfall and evaporation rate. (vi) Both trees to which dendrometers were attached showed slightly longer radii at time of leaf-fall than at time of cessation of growth changes. (vii) Between time of leaf-fall and the end of the observation period slight losses and recoveries also occurred. In one tree the end of the observation period saw a slight gain over the radius at leaf-fall, while in the other there was a slight net loss. (viii) Daily reversible variations were registered by the dendrograph one week before growth activity began, and continued in greater or lesser degree until the dismantling of the instrument on November 4. (ix) The daily curve showed maximum diameters about 6 a.m. and minima from 4 to 6 p.m., more often the latter time. *Author's summary.*

22. SILVICULTURAL SYSTEMS.

FORMS OF STAND

22.1 : 22.6 : 57.0. LAURIE, M. V. **The efficiency of irregular stocking.** *Indian For.* 67, 1941 (1–12). [Forest Research Institute, Dehra Dun.]

Attention is drawn to the trend in Europe, and particularly in Germany, towards silvicultural systems that result in uneven-aged forest. The theoretical advantages of such systems are: saving of space, exploitability of trees at their most paying size, reduction of the area to be worked over each year, and more uniform growth of the trees throughout life. The chief problems in uneven-aged forest are to secure adequate regeneration and to maintain the stocking of valuable species. From a discussion of these factors in relation to Indian conditions it is concluded that wherever there is promise of natural regeneration under an uneven-aged system the potential advantages of the latter should be considered. It is stressed that where forests have been brought into a state in which younger age classes are disproportionately represented, conversion to an even-aged system by clear fellings adjusted to obtain a complete gradation of age classes can be wasteful of both potential increment and time. This waste is likely to be minimized by selection treatment over a period during which its merits can be tested. If an even-aged system is ultimately found desirable, conversion can be delayed until the crop has reached its most paying size; if, on the other hand, regeneration is sufficiently encouraging, an uneven-aged stand should be aimed at, and in this case the sacrifice in attaining proper distribution of age classes is likely to be less than in conversion to even-aged forest. There is a pressing need for the establishment of experimental plots to compare the results of clear felling and selection treatment for various types of Indian forests.

22.14.2 : 32 : 66 : 12.19.2 : 12.25. FRITZ, E. **Redwood forest management for utilization.** *Mech. Engng., N.Y.* 62, 1940 (859–63). [University of California.] L.S.

The need is emphasized for reconciling good forest management with economic logging practice. Selective logging appears to be the most practical method for cutting Redwood, especially as the forests are mixtures of all size and quality classes, so that the uneconomic trees can be left for further growth and as seed-bearers. Properly equipped tractors are the most suitable means of extracting the timber and have the advantage of causing comparatively little damage to the residual stand. There are wide opportunities for collaboration between foresters and logging engineers in the planning of operations. Further problems for consideration are the reduction of breakage losses during felling, the centralization of barking at the mills, slash disposal, and the improvement of log-grading and scaling practice.

22.14.2 : 57.4 : 12.25. LENTZ, G. H.; CHAPMAN, H. H. **Comments on 'Growth and mortality during 10 years following partial cuttings in Loblolly Pine' by L. E. Chaiken.** *J. For.* 39, 1941 (720–1).

Two criticisms of points raised in the original paper [cf. *For. Abs.* 3 (41)]. First, attention is drawn to the heavy cuts that were made in the two stands of Loblolly Pine—66 per cent. of a 55-year-old stand and 82 per cent. of a 40- to 50-year-old stand being removed—and it is suggested that a lighter first cutting might have

given better results. Secondly, it is pointed out that nothing other than reduced increment and high mortality can be expected to follow selection cutting in old-field Pine that has long been neglected, and that clear cutting with reproduction by the seed-tree method is the only practical treatment for such stands.

22.88.2 : 12.26–8 : 43 : 24.3. UNITED STATES. **Annual report of the Allegheny Forest Experiment Station, 1940.** Philadelphia, Pa. [1941.] pp. 23.

In the second-growth stands of the northern hardwoods type it was found that fires caused a decrease in the percentage of Sugar Maple, Beech and Hemlock and favoured Sweet and Yellow Birch, Red Maple, Pin Cherry, and Black Cherry. Light cuttings in the original forest favoured Beech, Sugar Maple, Hemlock and Yellow Birch, while heavy cutting favoured Black Cherry, Sweet Birch and Red Maple (p. 6).

22.89 : 12.26–8 (44). BARBEY, A. La plus grande peupleraie d'Europe. [**The largest Poplar plantation in Europe.**] *J. for. suisse* 92, 1941 (141–7). [F.]

Note on the Chautagne plantation north of the Lac du Bourget. This plantation was created in 1936 on 750 ha. of drained, formerly swampy land, using chiefly *P. robusta angulata cordata* [× *P. robusta* C. K. Schneid.]

23. FORMATION OF STANDS

23 : 12.26–8 : 21.0 (66.9). NIGERIA. **Annual report on the forest administration of Nigeria for the year 1940.** Govt. Printer, Lagos. 1941. pp. 14.

Teak has been raised successfully from direct sowings and excellent results have been obtained in raising this species and *Gmelina arborea* on ridges in uncultivable swamps (p. 5).

23 : 22.1 : 12.19.2 (729.7). BROOKS, R. L. **The regeneration of mixed rain forest in Trinidad.** *Carib. For.* 2, 1941 (164–73). [E.e.span.]

Description of the technique adopted in the Arena Reserve, involving natural regeneration under a shelterwood, supplemented by planting of unregenerated gaps. This technique supersedes clear cutting with artificial regeneration, which has been proved to result in rapid deterioration of the soil.

23.1. *Natural Regeneration*

23.1 : 12.25. BARRETT, L. I. **Observations on requirements for restocking cut-over Loblolly and Shortleaf Pine stands.** *Tech. Note Appal. For. Exp. Sta.* No. 42, 1940. pp. 9.

Based on data collected in the coastal plain and Piedmont regions of the Carolinas and Virginia. Experience indicates that in order to ensure as many as 1,000 established seedlings per acre it is necessary to provide 200,000 to 300,000 seeds per acre. The Virginia seed-tree law requires that 3 Pine trees per acre 10 in. d.o.b. at stump (9 in. d.b.h.) or not less than 4 Pine trees per acre 9 in. d.o.b. at stump (8 in. d.b.h.) be left on the ground. This is shown to be inadequate to ensure consistent satisfactory restocking within a reasonable time, as it provides for only an average annual dispersal of 1,760 to 3,000 seeds per acre. Furthermore, a high mortality has been observed among 8-in. and 9-in. trees left after logging in stands over 50 years old. Measures essential to ensure maximum restocking are discussed. These are: (1) Cutting operations, which include (*a*) the two-cut system by which all but about 40 large seed trees per acre would be removed in the first cut, the remaining trees being cut after regeneration had become established, and (*b*) strip or group selection cutting. (2) Cultural measures, including (*a*) exposure of the mineral soil prior to seed fall, and (*b*) stand improvement operations to release Pine seedlings from undesirable competition.

23.1 : 12.25 : 43 : 12.11.21. LEBARRON, R. K. **The role of forest fires in the reproduction of Black Spruce.** *Proc. Minn. Acad. Sci.* 7, 1939 (10–4). [Lake States Forest Exp. Sta.]

Studies made in Minnesota have shown that Black Spruce (*Picea mariana*) re-seeds following fire and that pure even-aged stands of this species are thus established. Much of the seed is supplied from the dead trees on the burned area, as Black Spruce bears seed practically every year and differs from most conifers native to this region in that mature cones remain on the tree for many years and contain large numbers of viable seed for at least two or three years. As these cones are borne near the tip of the trees they are unlikely to be damaged by fire. Destruction of the ground vegetation and litter layer by fire also improves conditions for Black Spruce regeneration.

23.1 : 12.26–8. SARKAR, M. M. **A short note on the Sal reproduction in the Upper Bhabar Tract, at Raimatong, Buxa Division, Bengal.** *Indian For.* 67, 1941 (23–9).

A discussion of the preliminary results from experiments to secure Sal reproduction in this tract by natural regeneration, with the possible aid of broadcast sowing where insufficient seed-bearers are present. As the chief obstacle to seedling establishment is the dense evergreen undergrowth, the experiments have been concerned with measures such as burning, grazing, and rainy-season weeding, which are designed to reduce competition from this source. Some success has attended these measures, but it is still an open question whether to rely on burning alone, repeated for a long period of years, or to carry out rainy-season weeding with complete opening of the canopy for a period of perhaps three years or so.

23.1 : 12.26–8. JACOB, M. C. **Sal regeneration *de novo*: a rejoinder.** *Indian For.* 67, 1941 (337–46).

Criticism is made of numerous points on which a recent article by De [*For. Abs.* 3 (123)] was largely based. It is especially urged that burning has maintained Sal forest as a climax type in Assam and has encouraged Sal reproduction by inducing the light variety of *Imperata* grass cover under which alone the seedlings can best survive without weeding for any number of years. Abandonment of judicious use of fire would sooner or later necessitate the employment of artificial regeneration.

23.2. *Artificial Regeneration*

23.2 : 12.26–8 : 21.11. MADRAS. **Annual report on silvicultural research in the Madras Presidency for the year 1939-40.** Supt., Govt. Press, Madras. 1941. pp. 165.

Fourth-year results indicate the shade preferences for artificial regeneration of the following species to be: *Dipterocarpus indicus*—less than top canopy, *Swietenia macrophylla*—top canopy only, *Cedrela toona* and *Hopea parviflora*—slightly more than top canopy, and *Gluta travancorica*—slightly less than full evergreen shade (pp. 89).

23.21. Choice of Species

23.21 (75.9) : 12.26–8. EGLER, F. E. **Mahogany: a potential resource of South Florida.** *J. For.* 39, 1941 (725–6). [New York State College of Forestry.]

Ecological characteristics of *Swietenia mahagoni*, as observed in studies made in various parts of the Caribbean region, suggest that this species may have possibilities for economic development in southern Florida.

23.21 : 21.6 : 12.25. UNITED STATES. **Annual report of the Allegheny Forest Experiment Station, 1940.** Philadelphia, Pa. [1941.] pp. 23.

In plantations 5 years of age and older in Pennsylvania it was found that Red Pine gave the best survival, growth rate and bole form, Japanese Larch gave low initial survival but rapid growth and good bole form, Norway Spruce showed promise as a pulpwood species but did not compete successfully with grass or hardwoods, and White Pine suffered heavily from weevil (*Pissodes strobi*) damage (p. 6).

23.22. Preparatory Work. Auxiliary Measures

23.22 : 23.13. MADRAS. **Annual report on silvicultural research in the Madras Presidency for the year 1939-40.** Supt., Govt. Press, Madras. 1941. pp. 165.

Experiments have shown that in the regeneration of the dry fuel forests soil working is very beneficial, particularly if done between germination and the beginning of the first hot weather, in increasing the survival and growth of small plants and also in increasing the early height growth of seedlings established in normal rab regeneration (pp. 71–3).

23.22.1 : 11.47.2 : 12.25. FABRICIUS, L. Zur Bodendeckung mit Pflanzenstoffen. **[On covering the soil with plant materials.]** *Forstwiss. Cbl.* 63, 1941 (97–100). [G.] [Universität München.]

Further data obtained from trials in Schwabach, Bavaria [first reported in *Forstwiss. Cbl.* 60, 1938 (1 *et seq.*)] on powdery sand soils—the so-called Melmböden—in which early tree growth is notoriously poor owing to great seasonal variation in humidity and generally low fertility. Two plots of Pine/Spruce, each of 180 sq. m., planted in 1926 and treated in 1929 by covering the heavy weed growth with litter from the neighbourhood (chiefly heather, applied at a rate of about 7 kg. per sq. m.), have maintained their superior height and volume growth as compared with the untreated controls. In 1940 the mean heights of the 50 tallest Pine and the 20 tallest Spruce of each of

the treated plots were respectively 90·6 and 289·8 per cent. greater than the corresponding heights in the controls. This beneficial effect is ascribed to the dying-off of the covered weeds and to the action of the dead weeds and heather cover as a manure.

23.22.1 : 32.29.2. INDIA. **Forest research in India and Burma, 1939-40. Pt. I.—The Forest Research Institute, Dehra Dun.** Manager of Publications, Delhi. 1941. pp. 133.

The effect of slash burning on artificial reproduction was found to vary with different species. It had a marked stimulating effect on stump plants of *Morus alba* and *Tectona grandis*, on entire transplants of *Markhamia platycalyx*, and on direct sowings of *Dalbergia sissoo*, *Melia azedarach* and *Acacia catechu*, while no benefit was observed for entire transplants of *Morus alba* or *Hovenia dulcis* or direct sowings of *Shorea robusta*. Beneficial effects were generally slightly greater for areas where slash was burned and the ashes worked into the top soil than where either the ash was removed following the burn or where the ash from other burns was worked into the top soil of unburned plots. The effects of the last two treatments were found to be similar in magnitude but not additive. Analysis of soil samples taken from the treated plots indicated that burning and the application of ash have a marked effect in increasing the pH, while soils on which the slash was burned and the ash removed showed a relatively low value for nitrates (pp. 22–5).

23.22.2 : 12.26–8 : 21.0 (66.9). NIGERIA. **Annual report on the forest administration of Nigeria for the year 1940.** Govt. Printer, Lagos. 1941. pp. 14.

Success in plantations of Eucalypts, particularly *E. robusta*, *E. rostrata* and *E. maidenii*, in the Bamenda Highlands of the Cameroons, is apparently due to the cultivation of coco yams during the year before planting (p. 5).

23.22.2 : 12.26–8 : 2 : 47 : 57.9 : 76.1 (729.7). CATER, J. C. **The formation of Teak plantations in Trinidad with the assistance of peasant contractors.** *Carib. For.* 2, 1941 (147–53). [E.e.span.]

The cleared forest land selected for planting Teak is allotted to peasant contractors for 15 months in return for keeping the area free from weeds and complying with other specified requirements. They plant and harvest one crop before and another crop after the planting of stump plants of Teak by the Forestry Department.

23.23. Sowings

23.23.1. *Seed Procurement, Treatment, and Testing*

23.23.12 : 12.25 : 12.11.21. INDIANA. **Fifty-second annual report of Purdue University Agricultural Experiment Station, for the year ending June 30, 1939.** Lafayette, Ind. 1939. pp. 142.

Experiments show that seed from young (10-year) Jack Pine, Scotch Pine and Chinese Arborvitae (*Thuja orientalis*) is as viable and produces seedlings of as good early growth as that collected from older trees (p. 86).

23.23.15 : 12.25. BARTON, L. V. **Relation of certain air temperatures and humidities to viability of seeds.** *Contr. Boyce Thompson Inst.* 12, 1941 (85–102).

Tests made with seed of several herbaceous plants and of *Pinus palustris* showed moisture-absorption rates varying with the species, the order of the species remaining constant regardless of storage temperature and humidity. Under conditions of high temperature and humidity, however, loss of vitality proceeded much more rapidly than at lower temperatures and humidities. With 35 per cent. relative humidity all seeds took up less water at 20° or 30° C. than at 5° and 10° C. but with 55 and 76 per cent. relative humidity the peak of moisture absorption was at 10° C. No direct relation was shown between actual amount of water absorbed and subsequent viability. There was, however, a positive relation between high initial vitality and retention of viability under unfavourable storage conditions. Deterioration, once initiated, rapidly led to death of all seeds under unfavourable storage conditions, but at 5° C. all seeds kept well, even with high humidity and independent of initial vitality. The moisture content of seeds stored open in the laboratory showed seasonal fluctuations, being practically doubled in August as compared with January and February. Such fluctuations are believed to contribute to the deterioration of seed in open storage.

23.23.15 : 12.25–8 : 12.11.21. NEW YORK STATE. **Cornell University Agricultural Experiment Station. Fifty-second annual report. 1939.** Albany, N.Y. 1940. pp. 203.

Embryos of Red Ash and Black Ash have been grown without after-ripening by use of the embryo-culture technique by which embryos are removed from the endosperm, sterilized in hypochlorite, and transferred aseptically to nutrient agar containing sugar. This suggests that the embryos are not dormant and that some other factor prevents the seed from germinating without after-ripening (p. 143).

23.23.3. *Methods of Sowing*

23.23.3 : 12.25 : 07.7. OLERINSKI, V. Ya. **Results of four years of aerial sowing.** *Lesnoe Khozyaystvo, Moscow* 1941 (4), (53–7). [R.] L.S.

During 1937–40 a total of 4,556 ha. of land that had been cleared of forest, in a district of the Ryazan region, was sown with Pine, using 8,240 kg. of seed. With aerial sowing the cost of establishing the crop proved less than half that of planting. An examination of the sown areas in 1940 showed that, on an average, 13,000 Pine seedlings were established per ha., and that any blanks that resulted from irregularity of sowing had been filled with self-sown Birch, averaging 15,000–20,000 plants per ha., and, to a small extent, with other broadleaved species. Although in general aerial sowing proved a success both on unprepared land and on land that had been ploughed to keep down heavy weed growth, the results were unfavourable in several especially dry localities, where, it is thought, planting would have been the correct method.

23.24. Formation of Stands by Planting

23.24 : 12.11.15 : 11.62.11. DONNELLY, M. **Effects of vitamin B_1 on woody erosion-control plants.** *Science* 94, 1941 (71–2). [University of California Citrus Exp. Sta., Riverside.] O.R.S.

Tests in two Californian localities with 8 species and 1 hybrid, all deciduous, showed that no marked beneficial effects on either initial survival or initial growth rate were obtained by watering the soil around seedlings planted out in the field with a solution of vitamin B_1 in water at a concentration of 0·05 mg./1. With some species, indeed, the solution may have had an adverse effect upon survival. [Cf. abstract on p. 200.]

23.24.1. *Planting Material*

23.24.1 : 12.26–8. MADRAS. **Annual report on silvicultural research in the Madras Presidency for the year 1939–40.** Supt., Govt. Press, Madras. 1941. pp. 165.

Stump planting is the best method of artificial regeneration for *Tectona grandis*, and entire transplanting for *Swietenia macrophylla* and *Pterocarpus dalbergioides*, large (55-in.) transplants giving best results with the latter species (pp. 26–7).

23.24.1 : 12.26–8 : 76.1. SULIT, M. S. **Wild Teak seedlings as planting stock.** *Philipp. J. For.* 4, 1941 (57–62). [Bureau of Forestry, Philippines.]

In the experiment described three lots of wild seedlings of *T. philippinensis*, viz. (*a*) puddled seedlings, (*b*) seedlings packed in sawdust, and (*c*) controls, were planted 4 days after lifting, two of these days being spent in transit in moist gunny sacks. After 120 days the three lots gave survivals of 71, 78, and 82 per cent. respectively. The period during which the experiment was conducted was favourable, there being moderate rain throughout.

23.25. Formation of Stands by Vegetative Reproduction

23.25 : 12.26–8 : 12.11.22. MADRAS. **Annual report on silvicultural research in the Madras Presidency for the year 1939–40.** Supt., Govt. Press, Madras. 1941. pp. 165.

Successful regeneration by root suckers has been obtained for the species *Santalum album*, *Strychnos nux-vomica* and *Sapindus emarginatus* by trenching around the trees. The successful regeneration of *Casuarina equisetifolia* by layering the lower branches in plantations has been reported (pp. 8–9).

23.26. Plant Rearing. Nursery Practice

23.26 : 12.11.2 : 23.23 : 42 : 44 : 45. ENGSTROM, H. E., and STOECKELER, J. H. **Nursery practice for trees and shrubs suitable for planting on the prairie-plains.** *Misc. Publ. U.S. Dep. Agric.* No. 434, 1941. pp. 159. [Prairie States Forestry Project.]

The subject matter of this regional handbook is presented under the major headings:—tree planting in the prairie-plains region; collection and handling of seed; selection and maintenance of the nursery site; the water supply; ground

preparation and sowing; germination and seedling culture; special methods of growing planting stock; summary of nursery operations; nursery inventory; lifting and field grading; winter storage and shipping of nursery stock; seedling protection; pathology of deciduous seedlings; and nursery costs. A bibliography of 54 references and a reference list of tree and shrub species are appended.

23.26 : 23.24 : 60.31.2. EDWARDS, E. J. K. **The raising and planting of trees on the farm.** *Bull. Dep. Agric. S. Rhod.* No. 1178, 1941. pp. 16. *Repr.* from *Rhod. Agric. J.*

Simple directions are given on the appropriate nursery and planting-out practice for trees commonly grown on farms in Southern Rhodesia.

23.26 : 52.1 : 07.7. AAMODT, E. E. **A stem-caliper gauge for nurseries.** *J. For.* 39, 1941 (728). [Nicolet National Forest.]

The gauge is made from a sheet of brass or copper metal about 8 in. × 1 in. × $\frac{1}{8}$ in., which is split down the middle about three-quarters of its length, the two halves being spread apart to a desired width by heating. It is then calibrated along the notch by means of steel rods of known diameter and a suitable marker.

23.26.1 : 12.26–8. MADRAS. **Annual report on silvicultural research in the Madras Presidency for the year 1939–40.** Supt., Govt. Press, Madras. 1941. pp. 165.

While shading of nursery beds during the hot weather reduced mortality in seedlings of *Hopea parviflora* and *Dipterocarpus indicus*, it increased mortality in seedlings of *Cedrela toona* (p. 17).

23.26.3 : 23.24.4 : 42.21. INDIANA. **Fifty-second annual report of Purdue University Agricultural Experiment Station, for the year ending June 30, 1939.** Lafayette, Ind. 1939. pp. 142.

Fall transplanting of coniferous seedlings resulted in heavy losses from frost heaving, which was not prevented by a straw mulch. Of the species tested 3–0 Scotch Pine stock showed highest resistance to winter injury and 1–0 Chinese Arborvitae (*Thuja orientalis*) the lowest resistance (p. 87).

23.27. Arboriculture

23.27 : 46 : 42.31. PARR, F. L. **Aeration problems of shade trees.** *Arborist's News, Wooster, Ohio* 6, 1941 (52–4). L.S.

Damage to shade trees where the ground level is raised by fills can be avoided by providing adequate drainage and soil aeration. A practical method of securing these conditions is described.

23.27 : 47. PIRONE, P. P. **Maintenance of shade and ornamental trees.** Oxford University Press, New York. 1941. pp. 422. Pl. Sci. Lit. 13 (21), (23).

23.3. *Afforestation*

23.3 (77.3). SCHAVILJE, J. P. **Reclaiming Illinois strip mined coal lands with trees.** *J. For.* 39, 1941 (714–9). [Department of Conservation, Springfield, Ill.]

A brief report of the results obtained from scattered forest plantings made by strip-mine companies and from the intensive three-year programme of the Illinois Division of Forestry, and of the problems that have been encountered in this work. These are concerned mainly with new soil, soil moisture, selection of tree species, rabbit damage, planting methods, and costs. Afforestation of the spoil banks following strip mining is now considered feasible and future planting programmes have been arranged whereby an acreage equal to that stripped annually by the companies will be planted each season. Survival and growth reports are given for Black Locust, Black Walnut, Silver Maple, Cottonwood, Oak, Ash, Shortleaf Pine and other Pines.

23.3 : 11.62.11 : 11.48.2. ALTPETER, L. S. **Reforestation of sandblows in northern Vermont.** *J. For.* 39, 1941 (705–9). [Soil Conservation Service, Burlington, Vt.]

The use of mulches, supplemented by occasional brush fences, seems to be the most practical method for the control of sand movement in this region, and it appears that mulch definitely improves the site from the standpoint of plant growth. Plantations on these areas have so far originated from nursery stock, although the abundance of natural reproduction on sand areas protected by mulch indicates the possibilities of a direct-seeding method. Preliminary success has been obtained on open sand with 2–2 and large 2–1 coniferous stock and thrifty 2–0 Jack Pine stock has been successfully established on mulched areas. Black Locust has been successful only where moisture conditions were originally favourable or the site was protected by a mulch. It has not yet been determined whether a single,

early mulching of plantations established on windblown sands will be sufficient to guarantee continued stand thrift. *From author's summary.*

23.3 : 96.5 : 91.3 (56.43). SIDKI, I. **Brief notes on the necessity of promoting private tree planting in Cyprus.** *Forest Treasures, Nicosia* 2 (3), 1940 (15–8).

A brief discussion of the importance of tree planting in relation to climate, water supply, erosion, fuel supply, employment and amenities.

23.5. *Underplanting*

23.51 : 12.25 : 12.26–8 : 24. ZENTGRAF, E. Der Buchenunterbau in Kiefernbeständen. **[Underplanting of Beech in Pine stands.]** *Allg. Forst- u. Jagdztg.* 117, 1941 (205–13). [G.]

From investigations in underplanted Pine stands in the town forest of Frankfurt it appears that, provided the site is suitable for growing broadleaved trees, such stands can be transformed into mixed Pine/Beech stands within one rotation by regularly thinning and, where necessary, freeing the Beech trees.

24. TENDING OF STANDS AND TREES

24.2. *Thinnings*

24.21 : 12.25 : 56. AUSTRALIA. **Annual report of the Commonwealth Forestry Bureau for year 1940.** Govt. Printer, Canberra. 1941. pp. 16.

In a 'single tree' thinning experiment in *Pinus radiata*, where one to eight trees surrounding a single selected observation tree were removed, a linear relation was found between the increment in basal area of the observation tree and the number of trees, up to seven, that were removed (p. 7).

24.21 : 12.26–8 : 63. CENTRAL PROVINCES AND BERAR. **Administration report on the Forest Department in the Central Provinces & Berar for the year ending the 31st March, 1940.** Govt. Printing, Nagpur. 1941. pp. 38.

Results from thinning experiments with *Cleistanthus collinus* suggest that the most paying method of management would be to leave coppice clumps unthinned until about one-third of the stems are 4 in. or more in diameter, when the larger stems can be removed in a crown thinning. The remainder should be left until the majority are 4–6 in. in diameter. It appears that a 40-year rotation is too short for this species (p. 14).

24.3. *Opening of the Canopy. Release and Improvement Fellings*

24.31. **The preparation of sodium arsenite from local arsenical residues.** *Rubb. Res. Inst. Malaya Plant Bull.* No. 15, 1941 (14–7).

Crude arsenious oxide is a by-product of the roasting of tin ores in parts of Malaya, and can be readily and cheaply converted into a crude solution of sodium arsenite for use as a tree poison or weed killer. The strongest solution it is practical to make up is equivalent in arsenic content to a 50-per-cent. solution (by weight) of commercial sodium arsenite in water. For an arsenite corresponding to the sodium arsenite of commerce the ingredients required are 25 lb. of arsenical dust, 2½ gal. of water, and 10 lb. of caustic soda or 25 lb. of washing soda. It should, however, be possible to bring all the arsenious oxide into solution using only half the stated quantities of caustic soda or washing soda. When caustic soda is used the arsenical dust is mixed with caustic soda flake and the required amount of water is added; much heat is produced, and with stirring or shaking the process is rapidly completed without further trouble. If washing soda is used a convenient procedure is to dissolve the soda crystals in water and bring to the boil, then to make up the arsenical dust into a paste with water and add it slowly with continuous stirring to the boiling soda solution. Much frothing occurs, and the addition of the paste must be carefully regulated. When all the paste is added, the solution is boiled vigorously for about 30 minutes with occasional stirring. Though field tests have not yet been made, the solution made with the quantities first specified is unlikely to differ appreciably in killing power from a solution of comparable strength of commercial sodium arsenite. Pending such tests, the use of caustic or washing soda at half strength is recommended with some reserve. If the solution made as above is to be used neat it should be applied hot, as crystallization may otherwise occur. When weaker solutions are desired, a preliminary dilution to about half strength should be made while still hot, the resulting stock solution being further diluted as required. Solutions containing the equivalent of 1 cwt. of sodium arsenite cost $5–8 at

present prices; this compares favourably with the current price of imported sodium arsenite (about $25 per cwt.) and is only half the pre-war price of this commodity. The arsenical dust used for the experiments was bought at $3 per cwt. Samples of arsenical dust so far analysed have averaged over 90 per cent. arsenious oxide, and the quantities recommended are based on this figure.

24.4. *Shelterbelts. Windbreaks*

24.4 : 11.2 : 91.3 : 23.21 (213). WARREN, G. H. **Shelterbelts.** *E. Afr. agric. J.* 7, 1941–42 (8–19).

Data on shelterbelt effects from Russia, the U.S.A., Hungary, and Ceylon are summarized, and a *prima facie* case is shown to exist for the establishment of shelterbelts at the lower altitudes in East Africa with a view to reducing wind velocity and wind erosion, conserving soil moisture, and providing shade. Maize, coffee, and sisal are mentioned among the crops that might benefit from shelterbelt protection. It is thought that the establishment of shelterbelts would not present any serious silvicultural difficulties, and that open, well weeded belts would not increase the incidence of tsetse.

24.4 : 11.62 : 91.3 (47.6). BASOV, G. F. **The influence of shelterbelts in the Kamennaya Steppe [Voronezh, S. Russia] on surface run-off.** *Lesnoe Khozyaystvo, Moscow* 1941 (2), (8–18). [R.] L.S.

A discussion of some of the observations made by different workers during 1892–1938. The most striking fact of practical significance is that, provided forest belts are situated more or less at right angles to the prevailing direction of drainage, the forest percentage required to check surface run-off need not be very high. Thus run-off was practically nil in an area covered to 18 per cent. with forest belts. Even a lower percentage of forest may have an appreciable effect. From data collected during 1935–38 it is estimated that in areas covered to 6 per cent. and 18 per cent. with forest belts the amount of moisture that penetrated the soil in spring up to the end of the run-off period (chiefly derived from snow and from rainfall during this period) was about 1½ times and 3 times as great, respectively, as in the open steppe.

24.4 : 23.21 (77.2). INDIANA. **Fifty-second annual report of Purdue University Agricultural Experiment Station, for the year ending June 30, 1939.** Lafayette, Ind. 1939. pp. 142.

Results from experimental windbreak planting showed that Red Pine is a desirable species for this work, that Norway Spruce is less satisfactory, and that the form and growth of White Pine and Chinese Arborvitae (*Thuja orientalis*) make them desirable trees for windbreak plantings, the latter species in particular being useful on poor soils (pp. 87–8).

24.4 : 23.21 (77.2). INDIANA. **Fifty-third annual report of Purdue University Agricultural Experiment Station, for the year ending June 30, 1940.** Lafayette, Ind. 1940. pp. 112.

Studies of the effect of a series of green Willow windbreaks 20 rods apart and 30–45 ft. high on wind velocities and direction, showed that while each separate windbreak reduced wind velocity and stopped soil movement, their effect on wind velocities was not cumulative (p. 68). For results with Norway Spruce windbreaks see *For. Abs.* 3 (47).

24.4 : 60.31.2. BATES, C. G. **The windbreak as a farm asset.** *Fmrs' Bull. U.S. Dep. Agric.* No. 1405, (revised ed.) 1940. pp. 19. [Lake States Forest Exp. Sta.]

This semi-popular bulletin has special reference to the use of windbreaks in the open country of the prairie-plains region of the United States. It deals briefly with the protection given by windbreaks against conditions unfavourable to agricultural crops and with the effect of windbreaks on crop yields. Trees suitable for planting at different latitudes in central U.S. are listed.

24.5. *Pruning*

24.51 : 07.7. KROTKEVICH, P. G. **An electrical pruning saw.** *Lesnoe Khozyaystvo, Moscow* 1941 (1), (46–8). [R.] L.S.

Description of an outfit comprising a detachable headpiece, a pole, and a portable power unit. The chief parts of the headpiece are a circular saw 125 mm. in diameter, capable of cutting branches up to a thickness of 50 mm., a leather transmission, and an electric motor of 0·2 kw. operating at 3,000 r.p.m. The total weight of the headpiece is less than 3 kg. The pole may be 2–4 m. long. The power unit consists of a petrol-driven generator mounted on wheels or sledge runners, and may be designed

in different sizes for driving up to 5 saws at a time. Small-scale trials with this outfit have proved satisfactory. The cut obtained was cleaner than with hand pruning.

24.51 : 12.26–8. MADRAS. **Annual report on silvicultural research in the Madras Presidency for the year 1939-40.** Supt., Govt. Press, Madras. 1941. pp. 165.

Following the pruning of young *Swietenia macrophylla* all wounds were closed over at the end of five years and there was no sign of rot whether the wounds were treated with coal tar or not (pp. 82–3).

3. FOREST UTILIZATION.

31. PROPERTIES AND ANATOMY OF WOOD

31.0. *General Information on Woods*

31.0 (410). **A handbook of home-grown timbers (War emergency edition).** H.M. Stationery Office, London. 1941. pp. 68.

In preparing this—the third—edition, information has been added concerning species 'which, although not included in earlier editions, may yet play a part, however small, in supplying the demands of the timber-using industries during the present period of emergency'. The data on the various species are grouped under the following headings: the tree; the timber—general description; seasoning properties; wood bending properties; mechanical properties; natural durability; fire resistance; insect attack; preservative treatment; working qualities; uses; and supplies.

31.0 (94) : 33.8. **Timbers used in boat and ship building in Australia.** *Mon. News Lett. Div. For. Prod. Aust.* No. 115, 1941 (4–5).

31.0 : 12.26–8. **The properties of Australian timbers: White Cheesewood (*Alstonia scholaris* R. Br.).** *Mon. News Lett. Div. For. Prod. Aust.* No. 116, 1941 (3).

31.0 : 12.26–8. **The properties of Australian timbers: Southern Mahogany (*Eucalyptus botryoides*).** *Mon. News Lett. Div. For. Prod. Aust.* No. 115, 1941 (3).

31.0 : 12.26–8. **The properties of Australian timbers: Bollywood (*Litsea reticulata* and *L. ferruginea*).** *Mon. News Lett. Div. For. Prod. Aust.* No. 114, 1941 (4).

31.0 : 12.26–8 : 12.19. GREENHOUSE, S. **Balsa wood—its growth and manufacture.** *Wood Products* 46 (9), 1941 (16–8, 41–2).

More than 90 per cent. of the world's supply of this wood (*Ochroma* spp.) is obtained from the Guayaquil area of Ecuador. The tree produces large numbers of seeds which accumulate

in the ground and only germinate and grow when an opening occurs in the forest above. The tree grows quickly, up to 15 ft. high and 2–2½ in. in diameter the first year, is very fragile, easily injured and attacked by many enemies. It reaches merchantable size—60–90 ft. high and 30–45 in. in diameter above butt swelling—in about ten years. The trees are felled by native loggers using 6-lb. broadaxes, are cut into logs 10–18 ft. long, peeled, hauled to the river by teams of oxen and rafted to the mill. The wood is highly susceptible to insect and fungus attack and should be kiln dried to give best results.

31.1. *Structure. Anatomy. Identification*

31.1 : 12.14.2 : 12.25 : 12.14.3. BANNAN, M. W. **Vascular rays and adventitious root formation in *Thuja occidentalis* L.** *Amer. J. Bot.* 28, 1941 (457–63). [University of Toronto.] O.B.D.

Abnormal rays that differ markedly from the majority are found in the xylem of *Thuja occidentalis*. They generally begin at the pith, and in the inner wood are similar to other rays; in succeeding growth rings, however, tracheary cells of various shapes appear in some of the rows, and the rays expand considerably in both height and width, becoming as much as 10 cells wide. Some of these rays gradually narrow and become uniseriate again, others divide into several smaller rays, and a few connect with adventitious roots. The abnormal rays are distributed irregularly throughout the aerial parts of the tree, their frequency varying from a maximum average of 65 per sq. cm. of tangential section to nearly zero. When branches or parts of the stem come into contact with the ground or are covered with litter, adventitious roots are formed, the root meristems arising apparently in the cambial or phloem portions of the abnormal rays. Such rays occur exceedingly

rarely in roots; when roots arise adventitiously in the outer tissues, they are continuous with xylem rays composed usually of parenchyma cells only. *From author's summary.*

31.1 : 12.14.2 : 12.26–8. BARGHOORN, E. S. **The ontogenetic development and phylogenetic specialization of rays in the xylem of dicotyledons. II. Modification of the multiseriate and uniseriate rays.** *Amer. J. Bot.* 28, 1941 (273–82). [Harvard University, Cambridge, Mass.] O.B.D.

Phylogenetic specialization of rays in dicotyledons involves the suppression of either the multi- or uniseriate rays, as well as changes in the morphology of their constituent cells. In the wood of both roots and stems, variations of ray structure occur in successive stages of secondary growth. These ontogenetic changes may represent different levels of phylogenetic specialization. A study of successive stages in ray ontogeny indicates that phylogenetic specialization may be accelerated in different parts of the secondary xylem and in relation to other structures of the secondary body. The variations in structure that normally occur during ontogeny render the height and width of rays of doubtful value in the identification of woods. In species in which uniseriate rays have been eliminated from the outer secondary xylem, the early stages of development may show uniseriate or multiseriate rays only, or both together. In species that have no multiseriate rays in the outer secondary xylem, the rays in the inner secondary xylem are uniseriate only. Elimination of either type of rays may involve a trend from the heterogeneous to the homogeneous condition. In many cases, however, phylogenetic specialization produces large, thin-walled, heterogeneous, exclusively multiseriate rays. The loss of multiseriate rays may give rise to exclusively uniseriate rays composed solely of vertically elongated cells. Extensive vertical elongation of ray initials to produce high-celled rays of either type is phylogenetic as well as ontogenetic, and is frequently correlated with increasing structural specialization, reduction in cambial activity, and a tendency toward the loss of rays. The 'aggregate ray' is a highly specialized structure that occurs sporadically throughout the dicotyledons. The uniseriate ray in the dicotyledons is not homologous with similar ray structures in the lower vascular plants. *From author's summary.* [Cf. *For. Abs.* 3 (48–9).]

31.1 : 12.14.2 : 12.26–8. BARGHOORN, E. S. **The ontogenetic development and phylogenetic specialization of rays in the xylem of dicotyledons. III. The elimination of rays.** *Bull. Torrey bot. Cl.* 68, 1941 (317–25). [Harvard University, Cambridge, Mass.] O.B.D.

Complete absence of rays from the secondary xylem is a highly specialized condition, associated with reduction of cambial activity and in many cases with a tendency toward the herbaceous habit. It also occurs in many plants having anomalous secondary thickening. Elimination of rays is accomplished phylogenetically by the transformation of ray initials to fusiform initials. Conspicuous reduction, though rarely complete absence, of rays may result in plants that have undergone dwarfing or extensive modifications in relation to unfavourable environments. In these cases the formation of ray initials is suppressed in the cambium. Phylogenetically, the elimination of rays is initiated in the early rather than in the later stages of secondary xylem development. The tendency for loss of rays is extended, phylogenetically, into successively later stages of ontogeny until the wood is devoid of ray tissue. *From author's summary.* [Cf. preceding abstract.]

31.1 : 12.25. PHILLIPS, E. W. J. **The identification of coniferous woods by their microscopic structure.** *Repr.* from *J. Linn. Soc.—Bot.* 52, 1941 (259–320).

The first part of the paper describes a multiple-entry card key to coniferous woods. The features employed, which were selected only after extensive investigation, are illustrated and described. Data on over 100 of the more important tree species of 40 genera are given in tabulated form suitable for ready reference and for transference to key cards. In the second part of the paper, the composition, distribution, and wood anatomy of the 7 families of Coniferae are briefly dealt with, and under each genus the diagnostic features and methods of identifying the individual species are indicated with particular reference to timber-producing species. Some discrepancies in the existing botanical classification are apparent from this anatomical study. A select bibliography on coniferous wood anatomy is appended, and also a combined index and check list. *Author's summary.*

31.1 : 12.26–8 (7 : 8). RECORD, S. J., and HESS, R. W. **American woods of the**

family Boraginaceae. *Trop. Woods* No. 67, 1941 (19–33).

Descriptions of the woods of the various genera, with brief notes on uses, common names, and distribution.

31.1 : 12.26–8. GRUMBLES, T. L. **The comparative anatomy of the secondary xylem of four oriental species of *Celtis*.** *Lloydia, Cincinnati* 4 (2), 1941 (145–52). Pl. Sci. Lit. 13 (25), (11).

The species studied were *C. sinensis*, *C. philippinensis*, *C. tetrandra*, and *C. crenata*.

31.1 : 31.2 : 31.3. DADSWELL, H. E. **Does the study of wood anatomy have practical value?** *J. Coun. sci. industr. Res. Aust.* 14, 1941 (11–5). P.R.

A brief statement of the utility of anatomical study in identifying woods, in correlating structural differences with physical and mechanical properties, and in detecting defects such as reaction wood and brittle heart. Further possibilities are being opened up by the investigation of cell-wall anatomy and chemistry.

31.2. *Physical Properties*

31.2 : 12.26–8 : 31.0. THOMAS, A. V. **Merawan jangkang (*Hopea nervosa* King). Timber Test Sheet No. 31.** *Malay. For.* 10, 1941 (106–10).

Data on woodworking characteristics, description of timber, defects, physical and mechanical properties, seasoning properties, durability, and amenability to preservative treatment. The timber is unlikely to be commercially important, as the trees are usually rather small and of scattered occurrence, but it could safely be sold for the same purposes as that of *Hopea sulcata*.

31.21. Conductivity

31.21.4 : 31.22.1 : 31.23. **Computed thermal conductivity of common woods.** *Tech. Note For. Prod. Lab., Wis.* No. 248, 1941. pp. 4.

A chart, based on the results of numerous careful tests, makes possible the computation of the thermal conductivity of any wood for which the specific gravity is known and the moisture content can be determined or assumed.

31.22. Relation to Water, Air, Gases

31.22.1 : 12.25 : 12.14.4. AUSTRALIA. **Annual report of the Commonwealth Forestry Bureau for year 1940.** Govt. Printer, Canberra. 1941. pp. 16.

Log-moisture investigations with *Pinus radiata* have shown that moisture increases with growth rate of tree and with periods of rapid growth in any year, and tends to increase at successively higher levels in the stem, though at stump it is frequently greater than in the first 20 to 30 ft.; that moisture content decreases as the tree ages; and that there are big differences between the moisture content of sapwood (130 per cent.) and that of heartwood (30 per cent.) (p. 11).

31.25. Hardness

31.25 : 31.3 : 12.26–8. ARMSTRONG, F. H. **A note on the influence of resins and gums on resistance to wear.** *Emp. For. J.* 20, 1941 (78–80). [Forest Products Research Laboratory, Princes Risborough, Bucks.]

Abrasion tests on flooring blocks of Pyinkado (*Xylia dolabriformis*) showed low percentage losses in weight and absence of 'dusting-off' to be related to high alcohol/benzene solubilities. Samples of rift-sawn, intermediate-sawn and slash-sawn material were tested and it was determined that resin content did not modify the character of the ultimate breakdown of the block in each group.

31.27. Mechanical Strength

31.27 : 31.0 (54). INDIA. **Forest research in India and Burma, 1939-40. Pt. I.—The Forest Research Institute, Dehra Dun.** Manager of Publications, Delhi. 1941. pp. 133.

Tests indicate that specimens of Indian Spruce (*Picea morinda*) having 8 to 12 rings per inch possess the highest average impact strength, and that impact strength increases with an increase of summerwood up to 30 per cent. but not beyond that limit (p. 39). Strength tests of timbers of a number of species show the following results: (1) *Grewia elastica* (Bengal) is very strong, hard, and extremely tough, and is suitable for making tool and hammer handles of all sorts. (2) *Anogeissus acuminata* (Orissa) combines lightness with high impact and shear strength, and should make a good tool-handle species if properly seasoned and selected. (3) *Casuarina equisetifolia* (Nellore) poles showed sufficient strength for use in electric transmission lines but split badly and were too knotty. (4) *Terminalia tomentosa* and *T. paniculata* (Bombay) for

cross arms showed strength properties superior to those of Oak and should be suitable if properly seasoned. (5) *Anogeissus pendula* (United Provinces) is a small tree but the timber is very hard, extremely tough, strong, and heavy, and so is very suitable for heavy hammer handles, agricultural implements, etc. (6) *Ailanthus grandis* (Bengal) is a light, soft, cream-coloured timber that should be very valuable if blue stain and mould, to which it is highly susceptible, can be avoided (pp. 39–42).

31.27 : 31.1 : 12.25. PHILLIPS, E. W. J. **The inclination of the fibrils in the cell wall and its relation to the compression strength of timber.** *Emp. For. J.* 20, 1941 (74–8). [Forest Products Research Laboratory, Princes Risborough, Bucks.]

As part of an investigation into the relation between anatomical structure and the maximum crushing strength of British-grown Sitka Spruce, the influence of the degree of inclination of the spirally arranged fibrils of the middle layer in the secondary tracheid wall was examined. A satisfactory method of determining the fibril angle from the slope of the ray pit apertures is described. The normal variation in fibril angle within the tree was determined and the causes of this are discussed. It is important to note that the major variation is associated also with variation in size and structure of the elements, and this should be borne in mind when correlating fibril angle with properties of the wood; furthermore in adult wood the angular variation is limited. No relation between fibril angle and crushing strength was found, and it is suggested that the positive relation found by other workers may have been due to the inclusion of wood near the pith or compression wood, both of which are characterized by a much higher fibril angle than normal adult wood, but differ also in other respects. *Author's summary.*

31.3. *Chemical Properties*

31.3. JAHN, E. C., and COPPICK, S. **Nitration of woody tissues.** *Industr. Engng. Chem. (Industr. Ed.)* 33, 1941 (678–82). [New York State College of Forestry, Syracuse.] L.S.

Natural unextracted ground woody tissues of 10 different species, 2 groundwood pulps, and 3 partially delignified pulps were nitrated under suitable conditions with appropriate mixtures of nitric and sulfuric acids. Yellow or orange products, otherwise similar in physical appearance to the original material, are formed. If thoroughly washed with water, the products are stable. The yield depends upon the nitrating conditions and materials used, but under the same conditions the hardwoods and straws give lower yields than the softwoods. Nitration of tissues that have been partially delignified results in higher yields. The ester nitrogen content of the nitrated natural woody tissues is about 11 per cent. The nitrated tissues are about 20–30 per cent. soluble in acetone. There is a correlation between the hot water solubility and the content of readily oxidizable material in the nitrated product. By fractional precipitation from acetone solution, it is possible to divide the nitrated wood into several rather clearly defined fractions. *From authors' summary.*

31.3 : 12.25 : 33.32. ZOROASTROVA, E. A. **Chemical composition of Firs in the Far East.** *Bull. Far East. Branch Acad. Sci. U.S.S.R.* 33 (1), 1939 (198–202); *Chem. Zentr.* 1939, II, 3214. Chem. Abs. 35 (5311). P.R.

Good yields of cellulose were obtained from *Abies nephrolepis* Max. and *A. holophylla* Max. (about 63 per cent.), as well as from *Pinus sylvestris* L. (64·2 per cent.) and *Picea ajanensis* Fisch. (62·8 per cent.). *Pinus koraiensis* Sieb. & Zucc. showed a high resin content.

31.3 : 12.25 : 33.32. UEDA, Y., and NEBU, T. **Wood industry. XIV. Chemical composition of Canadian Hemlock (*Tsuga heterophylla* Sargent).** *Cellulose Ind., Tokyo* 16, 1940 (300, 35). [Jap.e.] Chem. Abs. 35 (5311). P.R.

A sample of Canadian Hemlock was powdered and passed through a 100-mesh sieve. The part retained on the sieve was air-dried and analysed. The loss was 9·26, alcohol- and benzene-soluble 2·17, cellulose 50·40, soluble pentosan 4·79, lignin 25·25, mannan 7·31 and galactan 0·48 per cent. The cellulose contained α-cellulose 70·76, pentosan 10·06, methoxyl 4·88 and ash 0·50 per cent.

31.3 : 12.26–8. TURRELL, F. M., and FISHER, P. L. **Lignin content of *Citrus* wood.** *Calif. Citrogr.* 26, 1941 (254, 273). [University of California Citrus Exp. Sta.] L.S.

Potential uses of lignin are noted, a possible relationship between lignin production and fruit granulation is discussed, and the lignin content of various species and varieties of *Citrus* is indicated.

31.4. *Durability. Decomposition*

31.41. Natural Durability

31.41 : 12.26–8 : 13.2 : 12.21. BRITISH HONDURAS. **Abridged report of the Forest Department for the year ended 31st December, 1940.** Govt. Printer, Belize. 1941. pp. 5.

Of the species being tested in a 'graveyard' experiment without the use of preservatives the following are so far resistant to termites, ambrosia beetles, and decay: *Tabebuia chrysantha*, *Aspidosperma megalocarpon*, *Achras chicle* and *Licania hypoleuca*. *Calophyllum*, *Simaruba*, *Vochysia*, *Zanthoxylum* and *Dialium* show good resistance to termites and pinworms (p. 2).

31.41 : 33.54 : 12.25. MEAGHER, G. S. **Service life of untreated Juniper fence posts in Arizona.** *Res. Note Sthwest. For. & Range Exp. Sta.* No. 89, 1940. pp. 4.

A study of the behaviour of 3 species of Juniper (*Juniperus utahensis*, *J. monosperma* and *J. pachyphloea*) as fence posts under four fairly distinct climatic conditions, varying in temperature and moisture, indicated that Juniper sapwood is not durable, the heartwood is very durable, the heartwood of all three species is about equal in durability, and, other things being equal, the average service life of posts differs in the four climatic zones, moisture appearing to be the principal limiting factor. A post specification is set up giving the minimum diameter of heartwood required at ground line and butt to meet a minimum standard of 80 per cent. utility after 40 years of service.

31.41 : 33.54 : 12.25. MEAGHER, G. S. **Service life of untreated Juniper and Cypress fence posts in Arizona.** *Res. Rep. Sthwest. For. & Range Exp. Sta.* No. 2, 1940. pp. 9.

Cf. preceding abstract. Untreated Cypress (*Cupressus arizonica* and *C. glabra*) posts are moderately durable although the resistance of the heartwood to decay is variable. These species should be given a preservative treatment before use as posts in permanent fences.

31.41 : 33.54 : 12.26–8. LONG, W. H. **The durability of untreated Oak posts in the Southwest.** *J. For.* 39, 1941 (701–4).

Studies were made of the durability of untreated fence posts of *Quercus utahensis*, *Q. arizonica* and *Q. emoryi* in Arizona and New Mexico at elevations of 4,500 to 9,000 ft. on fences ranging in age from 5 to 60 years old. The factors governing deterioration of the fences were found to be age of fence, species of Oak, and condition of post when put in the ground. It is concluded that fences of sound, untreated posts of *Q. utahensis*, set green and unpeeled, should be serviceable for 30 to 40 years; that *Q. arizonica* is less desirable than *Q. utahensis* but is superior to *Q. emoryi*; that posts seasoned or peeled are less durable than similar green, unpeeled ones; and that posts with 'catfaces', heart rots, knot holes or that are dead when cut, rot faster than sound posts under a similar environment. Unsplit posts 7–10 in. in diameter, green, unpeeled, and free from defects when set, proved the most durable. *Stereum hirsutum* was the main agent of decay in posts of *Q. utahensis* and *Q. arizonica*.

31.41 : 33.54 : 33.36.1. GEETE, E. Hållbarheten hos stängselstolpar. [**Durability of fence posts.**] *Skogen* 28, 1941 (126). [Sw.] L.S.

A brief report is given of a Danish experiment on the durability of untreated and treated fence posts of various species, which were 'planted' in sandy soil in 1934, each test series consisting of 8 posts. Renewals for each of the years 1937 to 1940 are shown in the table opposite.

31.42. Attack by Plant Organisms

31.42 : 12.25 : 31.27 : 31.23. FINDLAY, W. P. K., and PETTIFOR, C. B. **Dark coloration in Western Red Cedar in relation to certain mechanical properties.** *Emp. For. J.* 20, 1941 (64–72). [Forest Products Research Laboratory, Princes Risborough, Bucks.]

Comparison of the strength properties of samples of Canadian Western Red Cedar (*Thuja plicata*) heartwood that is of a dark brown colour with that of normal light colour showed the former to be less tough, softer and weaker in compression than the latter by about 20 per cent. and to have a lower specific gravity, this difference being closely correlated with the difference in strength. Fungus mycelium was almost invariably present in the darker wood and absent in the light-coloured wood and it is concluded that the dark coloration, lower specific gravity and reduced strength properties are brought about by fungal attack. The fungal hyphae were observed to have penetrated the cell walls in the manner described as typical of *Poria weirii*, but definite identification

Species and treatment	No. of renewals				
	1937	1938	1939	1940	Total
Norway Spruce	3	4	0	1	8
Douglas Fir	0	3	0	0	3
Sitka Spruce	5	2	0	0	7
Silver Fir	7	0	0	1	8
Japanese Larch	0	0	0	1	1
Scots Pine	0	4	0	0	4
Cleft Oak	0	0	0	0	0
Sawn Oak	0	0	0	2	2
Round Oak	0	0	0	1	1
Norway Spruce, brushed with carbolineum	0	1	0	2	3
„ „ impregnated with 4-per-cent. copper sulphate solution	0	0	0	1	1
„ „ brushed with creosote oil	0	0	0	3	3
„ „ „ „ 'Solignum'	0	0	0	1	1
„ „ „ „ 'Cuprinol'	0	0	0	0	0
„ „ „ „ 'Solar Oil'	0	1	0	2	3
„ „ charred	1	3	0	2	6
Cleft posts of Scots Pine, impregnated with coal tar ('Collestrup A/S')	0	0	0	0	0
Round posts of Scots Pine, same treatment	0	0	0	0	0

of the fungus present was not possible, and the alterations observed may be brought about by a fungus of the staining type. *From authors' summary.*

31.42.11 : 12.21 : 12.11.23. EDGECOMBE, A. E. **The growth rate of several wood-inhabiting fungi.** *Phytopathology* 31, 1941 (825–31). [Northwestern University, Evanston, Illinois.]

When grown in culture under uniform conditions the six fungi tested showed widely divergent growth rates. The average daily growth in diameter of mycelial mats was 8 mm. for *Collybia velutipes* and *Pleurotus ostreatus*, 5·5 mm. for *Merulius lacrymans*, 4·8 mm. for *Pleurotus ulmarius*, 3 mm. for *Pholiota adiposa*, and 1·2 mm. for *Armillaria mellea*.

31.42.12 : 31.27 : 33. **Utilization of blue-stained lumber.** *Tech. Note For. Prod. Lab., Wis.* No. 184, (revised ed.) 1941. pp. 3. P.R.

Toughness is the only strength property that is significantly affected by blue stain, and blue-stained lumber might well replace bright material for many uses where appearance or strength are not primary considerations. Stained lumber should not be accepted, however, until it is proved to be satisfactory for the intended use. Brief notes are included as an aid to distinguishing blue stain, moulds, and wood-destroying fungi. [Cf. *For. Abs.* 3 (54).]

31.43. Attack by Animal Organisms

31.43 : 13.2. **Pinhole or powder-post damage? How to distinguish two common types of insect attack in hardwoods.** *Leafl. For. Prod. Res. Lab.* No. 17, 1941. pp. 4.

31.43 : 13.2 : 31.42.11. FISHER, R. C. **Studies of the biology of the death-watch beetle, *Xestobium rufovillosum* de G. IV. The effect of type and extent of fungal decay in timber upon the rate of development of the insect.** *Repr.* from *Ann. appl. Biol.* 28, 1941 (244–60). [Forest Products Research Laboratory, Princes Risborough, Bucks.]

The minimum duration of the life cycle of *X. rufovillosum* at 22–25° C. and 80–90 per cent. relative humidity (equivalent moisture content of wood 18–20 per cent.) has been determined in a series of wood samples representing different degrees of decay—loss in oven-dry weight due to fungal attack, expressed as a percentage of the original dry weight of the sound wood, being taken as a measure of the extent of decay. Oak sapwood decayed by *Phellinus cryptarum* (a white rot) and *Coniophora cerebella* (a brown rot), and Willow decayed by *Polystictus versicolor* (a white rot), were used. It is shown that sound timber is unsuitable for infestation by first-stage larvae. In wood decayed by fungi of the brown or white rot types the rate of boring and

development of the larvae increases with increasing decay. The rate of larval development and the duration of the life cycle are also shown to be affected by changes in density and mechanical strength of timber that result from fungal attack. These findings are discussed in relation to the published results of the chemical aspect of the investigation [*For. Abs.* 2 (304)], which suggest that depreciation in mechanical strength is the major effect of fungal decay responsible for the decreased duration of the life cycle associated with increased extent of decay. The significance of this conclusion is examined in relation to the physiology of nutrition of wood-boring insects, and it is concluded from the biological results of the present investigation that the available evidence is insufficient to exclude the possibility that decay might produce changes in the nutritional value of the wood that might affect the rate of development of the insect. Reconsideration by the wood chemists of the chemical data has revealed that the nitrogen metabolism of the insect is affected by the presence of fungal decay in timber. The nutritional value of decayed wood in relation to its nitrogen content and distribution, together with the depreciation in mechanical strength that results from fungal attack, is now concluded to be of prime importance in determining the suitability of timber for infestation and the rate of development of the insect in it. *From author's summary.*

31.43 : 13.2. GEMIGNANI, E. V., and RODRÍGUEZ, R. Daños causados a las maderas por el *Hylotrupes bajulus* (L.). **[Injury to timber by *Hylotrupes bajulus*.]** *Rev. Soc. ent. argent.* 10, 1940 (370–8). [Span.] R.A.E. A29 (497).

A case is recorded of injury to a wooden floor in a house in Buenos Aires by *Hylotrupes bajulus* L., and it is stated that damage by this beetle is common in houses there and that it was introduced into Argentina in Pine battens. Descriptions are given of the genus *Hylotrupes* and of the adult of *H. bajulus*, with a list of its subspecies and varieties.

31.45. Injury by Fire

31.45 : 33.15 : 38.2. MCNAUGHTON, G. C., and HARRISON, C. A. **Fire-resistance tests of plywood-covered wall panels.** U.S. Forest Products Laboratory, Madison, Wis. No. *R*1257, 1940. pp. 10 + tbls., gphs., and plates. P.R.

31.8. *Quality and Defects of Timber*

31.8 : 12.26–8 (73). PAUL, B. H. **Quality comparisons of hardwoods from the southern Appalachians with that of northern growth.** *Sth. Lumberm.* 163 (2048), 1941 (35–6). [Forest Products Laboratory, Madison, Wis.]

Values of rate of growth, specific gravity and hardness for 11 different species are tabulated separately for second-growth and old-growth hardwoods from the Southern Appalachian Mountains and from the Northern States. These data are discussed and it is concluded that species native in both regions might produce wood of practically the same quality in both the north and south.

32. HARVESTING OF WOOD.

LOGGING

32 : 12.25 : 33.17 (931). **Milling of Rimu in New Zealand.** *Aust. Timb. J.* 7, 1941 (312–3, 323).

The paper includes short notes on the extraction, transportation, and milling of *Dacrydium cupressinum*. This species represents over half the total timber production of New Zealand and in the year 1938–39 the total Dominion production of sawn Rimu amounted to 188,536,482 super. ft. The logs are skidded by winch, usually steam-powered, but in one case driven by a 65-h.p. electrical motor. Transport is principally by rail, using steam locomotives, but tractors and lorries are also employed. The mills are comparatively small, with an annual output usually below 2 million super. ft., and are generally steam-powered.

32 : 12.26–8. BAYLEY, P. **Logging Greenheart.** *Timberman* 42 (12), 1940–41 (34–5, 48).

A brief note on the methods used for transporting Greenheart (*Ocotea rodioei*) from stump to mill.

32.2. *Felling and Related Operations*

32.25 : 76.1 : 33.02 : 12.26–8 : 22.14.2. SWINGLER, W. S. **Good forestry is sound economics.** *Paper Tr. J.* 113 (5), 1941 (12, 14). [U.S. Forest Service.] P.R.

A study of the effect of minimum tree diameter upon cutting costs for pulpwood from northern hardwood stands in Pennsylvania

showed conclusively that: (i) Cutting down to a 5-in. diameter limit increased cutting and conversion costs by slightly more than 51 cents per cord as compared with cutting to diameter limits of 8 or 11 in. Between the two latter groups there was no material difference in costs. (ii) As the solid wood per cord varies directly with diameter, the pulp companies will receive more solid wood by limiting their cutting or purchasing to wood from trees over 8 in. in diameter. Observance of an 8-in. diameter limit would also shorten the period required to grow a second crop of pulpwood.

32.25 : 82 : 33.02 : 07.7. KOROLEFF, A. **Pulpwood cutting: efficiency of technique.** *Woodlands Section, Canadian Pulp & Paper Association* 630 (B–7–a), 1941. pp. xiv + 122 + 3.

The report of a study undertaken to determine efficient methods and common faults in the technique of pulpwood cutting [cf. *For. Abs.* 3 (140)]. Detailed time and motion studies covering a complete day's work for each of five efficient and five inferior cutters was made at each of 12 typical operations representing 9 member companies of the Association. Although both groups of cutters had on the average the same ten-hour working day and the same actual working time, the 'poor' cutters took about 55 per cent. longer than 'good' cutters per unit of wood produced. This surplus time, indicative of waste effort, was determined for each individual step of work up to piling the wood. The fundamental requirements of efficiency in cutting are considered in detail and are as follows: (1) Cutting tools should be chosen to suit conditions and must be maintained in good working order. (2) Observance of certain principles in the manipulation of cutting tools is essential for efficient work. (3) The work should be properly planned in relation to existing conditions. (4) Appropriate technique should be followed in execution of each step of work and should be varied consistently with conditions. (5) The best cutting technique should combine economy of effort with adequate safety of work. *From author's summary.*

32.25 : 82 : 33.06. SUNDBERG, C. G. Ett bidrag till kännedomen om arbetsprestationen vid vedhuggning. **[A contribution to our knowledge of the rate of work in cutting fuelwood.]** *Skogen* 28, 1941 (139–43). [Sw.] L.S.

The results are given of time studies in fuelwood cutting of two types: (i) the cutting of standing trees, including felling, cross-cutting, cleaving, etc.; (ii) the cutting of logging waste such as tops, cull logs, and small trees left by the fellers after timber or pulpwood fellings. By far the most important factor in both types of cutting was the diameter of the material, the time required to cut a given volume decreasing sharply with increasing diameter. Secondary factors were volume per ha., branchiness, length and curvature of the stems, cleavability, and ground conditions and snow depth. Broad average figures for cutting rates in operations of the first type are given as 0·37, 0·44, 0·50, 0·55, 0·58, 0·60, and 0·63 cu. m. stacked measure per hour for average breast-height diameters of 10, 12, 14, 16, 18, 20, and 25 + cm. respectively. In an operation of the second type the diameter factor is governed by the proportion of cull logs and the top diameter to which the main crop of timber is cut; thus cutting rates are increased by a high proportion of cull logs or a high top-diameter limit for the timber. If the proportion of cull is high and timber has been cut to a top diameter of 6–7 in., the rate of cutting should be in the neighbourhood of 0·55–0·60 cu. m. stacked measure per hour, whereas if most of the wood is in tops and small trees, after cutting timber to a top diameter of 3½–4 in., the cutting rate will not exceed 0·35–0·40 cu. m. stacked measure per hour. Such figures may be used as very rough approximations for estimating the time required for fuelwood operations but may be considerably modified by the secondary factors mentioned above.

32.25 : 82 : 33.06 : 07.7. SUNDBERG, C. G. Några synpunkter på vedhuggningens rationalisering. **[Some observations on the rationalization of fuelwood cutting.]** *Skogen* 28, 1941 (167–70). [Sw.] L.S.

Fuelwood operations do not permit the large-scale use of mechanical equipment, and the main opportunity for rationalization lies in improving and simplifying present tools and methods. The chief points made in this article are:—(i) Quality requirements differ widely for various categories of fuelwood, hence care should be taken to cut the wood in the particular form required by its eventual use. (ii) All possible steps should be taken to secure quick drying of the wood. (iii) The best support for fuelwood stacks is afforded by side

stakes connected by a crossbar nailed firmly to their top ends. (iv) Each stage of conversion should take place where and when the lowest costs result. Under some conditions it is more economical to cut the wood from long logs skidded to roadside landings than to cut and stack at various points in the woods. If the operation is large enough this method may also render possible the use of a portable cutting-and-cleaving machine at the landings: the experimental use of one such machine gave costs (including interest and amortisation) 65–70 per cent. of those of manual conversion. (v) Cross-cutting with the cross-cut saw takes about 40 per cent. longer than with the bow saw, giving a loss of about 10 minutes per stacked cu. m. The bow saw can also be used for felling in stands of small-diameter wood, and the cross-cut saw should be necessary only for large wood. (vi) A sawing horse gives increased efficiency when cutting small material. (vii) Cleaving equipment should consist of a trimming axe, a 'sledge-axe', and a twisted, ribbed wedge. The sledge-axe is a combined sledge hammer and cleaving axe. The twist on the wedge gives easier cleaving, and the ribs prevent the tool from jumping out. (viii) Unskilled cutters should receive courses of instruction in the technique of cutting.

32.25 : 82. UNITED STATES. **Annual report of the Allegheny Forest Experiment Station, 1940.** Philadelphia, Pa. [1941.] pp. 23.

A study of the effect of minimum tree diameter on efficiency of cutting operations showed that: (1) The conversion time per cord for trees 5–8 in. in diameter was 15·5 man hours compared with 9·6 man hours for trees 8–11 in. and over. (2) Stacked cords of 52-in. wood from trees 5–7·9 in. in diameter had 89 cu. ft. of solid wood, those 8–10·9 in. 97 cu. ft., and those 11 in. and over 105 cu. ft. (3) Labour needed to cut, peel, cross-cut, and stack 100 cu. ft. of timber cut from 5–8 in. trees was 1·9 times that for 100 cu. ft. of timber from trees 11 in. and over (p. 4). [Note preceding abstracts.]

32.29 : 07.7. **Clearing: special toothed dozers make task easy.** *Timberman* 42, (9), 1940–41 (24).

Bulldozer blades fitted with teeth of good size and made of tough material are an improvement over the straight blade for land clearing. After removing stumps and weed trees the teeth can be worked up and down to shake out the dirt before moving the material to the windrow for burning.

32.3. *Sorting*

32.3 : 35 : 98.3. INDIANA. **Fifty-second annual report of Purdue University Agricultural Experiment Station, for the year ending June 30, 1939.** Lafayette, Ind. 1939. pp. 142.

The marketing of certain hardwoods in the form of potential products, e.g. Walnut as stumps for veneering, veneer logs, and saw logs, gave considerable higher stumpage returns than when sold by the tree or for a lump sum without reference to volume or quality for any particular product (p. 89).

32.9. *Transport*

32.91.11 : 76.1 : 32.91.12. BROMLEY, W. S. **Tractor vs. team in ground skidding in northern Michigan.** *23rd Annual Meeting Proceedings, Woodlands Section, Canadian Pulp & Paper Association* No. 616 (H–2), 1941 (34–6). [University of Michigan.]

From a study undertaken to compare the performance and costs of tractor and team skidding it appears that the tractor alone or in combination with teams is the more efficient method for saw-timber stands of northern hardwoods in the Lake States. It was shown that (*a*) tractors can handle larger logs more economically than average teams, (*b*) the tractor is superior to the team as a source of power for pulling loads of logs, and (*c*) the tractors' relative efficiency was the more apparent the longer the skidding distance.

32.91.22 : 07.7 : 32.96. MATTHEWS, D. M. **Machine rates as the basis for the selection of hauling and loading equipment.** *23rd Annual Meeting Proceedings, Woodlands Section, Canadian Pulp & Paper Association* No. 616 (H–2), 1941 (30–4). [University of Michigan.]

Consideration of the factors that determine the selection of different trucks and loading equipment for efficient use on a particular operation.

32.91.22 : 07.7 : 76.1. **Hauling 298,171 feet per day with trucks.** *W. Cst. Lumberm.* 68 (10), 1941 (24, 26, 60).

Detailed cost data are given for a truck operation on which 10 Diesel and 6 petrol trucks were used. Costs totalled $1·648 per

thousand bd. ft. for Diesels and $1·935 per thousand for petrol trucks. For 9 new Diesels the average length of haul was 16·15 miles, the number of trips per day was 3·16, and the average log load was 6,300 bd. ft. per truck.

32.91.3 : 01.7. LÁNGOS, L. Erdei csúsztatópályák tervezése. **[The planning of timber slides.]** *Erdész. Lap.* 80, 1941 (251–64). [Hu.g.f.e.]

A table is included, which, it is claimed, considerably simplifies the calculation of the final velocity of the timber. A special diagram or a slide rule may be used as alternatives to this table.

32.92–4 : 33.02 : 07.7. KELLY, J. L. **Watering pulpwood with roller-bearing wooden rollers.** *Pulp Paper Mag. Can.* 42, 1941 (544–5). [Price Brothers & Co., Ltd.]

A system of wooden rollers fitted with roller bearings into a wooden frame was found to be highly efficient for moving stranded pulpwood from lake shore to lake. It could be used up to a length of 140 ft., or further on a sloping bank of minimum grade of 4 per cent.

32.92–4 : 33.02 : 76.1. LAMOTHE, G. E. **Water transportation of pulpwood.** *23rd Annual Meeting Proceedings, Woodlands Section, Canadian Pulp & Paper Association* No. 616 (H–2), 1941 (36–7). [Price Brothers & Co., Ltd.]

From experience in the Saguenay drainage area, Quebec Province, it has been found that water transportation is the most economical for pulpwood, particularly when it is available close to the cutting operation. The improvement of small steams, even those with a drainage area of less than 1 sq. mile, is worth undertaking so long as a storage pond can be found and there is sufficient grade to drive with small quantities of water. Tests have shown that 75 to 150 cu. ft. of water per second are required to drive improved watersheds of 3 sq. miles or less in area and that with this amount 1–1·5 cords of pulpwood can be sluiced per minute.

32.95 : 38.4 : 07.7. BIELER, E. Wertvolle Neuerung auf dem Gebiete des forstlichen Transportwesens. **[Valuable innovation in the field of forest transport.]** *Schweiz. Z. Forstw.* 92, 1941 (137–42). [G.]

Description of a patented rope-way outfit by means of which logs can be pulled and lifted towards the dead rope from a distance of about 100 m. on either side of the rope-way and then lowered downhill, using the same live rope for handling the load throughout. The pulley system that carries the live rope is housed in two separate carriages running on the dead rope, the upper carriage serving by an automatic interlocking and releasing device to stabilize the lower carriage at any desired point along the rope-way.

32.95 : 38.4 : 09.1. HAFNER, F. Zur Geschichte der Beförderung von Holz auf Draht- und Seilriesen. **[On the history of the transport of wood by means of cableways.]** *Forstwiss. Cbl.* 63, 1941 (100–9). [G.]

A brief survey. The bibliography includes 70 references from Central European literature.

32.96 : 07.7. **Loading heavy Fir logs.** *W. Cst. Lumberm.* 68 (10), 1941 (16, 61).

Note on a log loader equipped with a 45-ft. heeling boom and powered with a 150-h.p. Diesel, which can easily handle logs having a water scale of 9,000 bd. ft. It is used in combination with tractors, and logging is done direct to the road.

33. CONVERSION AND PRESERVATION OF WOOD

33.1. *Mechanical Conversion excluding the Manufacture of Mechanical Pulp*

33.12. Joinery

33.12 : 12.26–8. **Nailing dense hardwoods.** *Tech. Note For. Prod. Lab., Wis.* No. 247, 1941. pp. 3.

Nailing of dense hardwoods can be improved, both as regards ease of operation and results, by using slender nails with blunted points, 'easing' in the nails, using wider nailing margins, applying beeswax on the nail point (this may reduce holding power slightly), and by using boards that are not warped.

33.15. Manufacture of Veneers and Laminated Wood. Gluing

33.15. STAMM, A. J., and SEBORG, R. M. **Resin-treated, laminated, compressed wood.** U.S. Forest Products Laboratory, Madison, Wis. No. *R*1268, 1941. pp. 9 + plate. P.R.

A process is described whereby plies are treated with an unpolymerized, water-soluble, resin-forming mix in such a way that the constituents are deposited within the fine cell-wall structure and chemically bonded to it.

Plies thus treated can be compressed at much lower pressures than are ordinarily required, and the product has a higher water resistance than that obtainable by other processes. The present process renders possible the use of a single compression and assembly operation for making plywood with compressed, resin-treated faces and an uncompressed core. Properties of the products and possible uses are discussed.

33.15. ALBERT PRODUCTS, LTD. **Improvements in or relating to the manufacture of plywood and application of veneers.** *British Patent* No. 510,803, Aug. 8, 1939. pp. 2. P.R.

Specification of a method of bonding plywood or veneers by means of sheets, films, or the like of paper treated with aqueous emulsions of water-insoluble, heat-hardenable artificial resins, which are inserted between the surfaces to be bonded and subjected to pressure and heat. Sulphonated aliphatic alcohols may be used as emulsifiers.

33.15. BÄSELER, W., DIETRICH, J., and TH. GOLDSCHMIDT AKTIENGESELLSCHAFT. **Method of gluing together workpieces, particularly those of the thick-walled type.** *British Patent* No. 518,289, Feb. 22, 1940. pp. 3. P.R.

A method is specified of gluing workpieces, particularly of thick wood, with thermo-setting adhesives which are heated by passing current through an electrical conductor embedded in the joint. Heat may be supplied at different intensities in different parts of the glue joint by modifying the form of the conductor.

33.15. NEVIN, J. V. **Plywood.** *U.S. Patent* No. 2,232,718, Feb. 25, 1941. Chem. Abs. 35 (3744). P.R.

Specification of a method of making hot-pressed plywood by applying two coats of a thermosetting resin to the core, drying each coat after application, and adding a further coat immediately before assembling the plies, which is done while the third coat is still wet.

33.15. LÜTY, W. (to Th. Goldschmidt Corp.) **Laminated lumber.** *U.S. Patent* No. 2,241,312, May 6, 1941. Chem. Abs. 35 (5278). P.R.

Various operative details of manufacture, including use of an adhesive, pressure, and electrically generated heat.

33.15. BRITISH INDUSTRIAL PLASTICS, LTD., and BROOKES, A. **Improvements in or relating to adhesives.** *British Patent* No. 537,176, June 12, 1941. pp. 3. P.R.

Specification of the preparation and use of an adhesive comprising an aqueous-urea-formaldehyde resin adhesive with which is incorporated a comminuted cellulosic filler impregnated with benzyl alcohol. A hardening agent may be used in conjunction with the adhesive.

33.15. OGAWA, K. (to Nikka Seiyu K. K.) **Adhesive for wood.** *Japanese Patent* No. 134,071, Jan. 8, 1940. Chem. Abs. 35 (4877). P.R.

Soybean proteins are freed from fibres, and treated with Na_2CO_3 and $Ca(OH)_2$ or soda lime and urea.

33.15 : 31.22.1 : 33.36.3. PERRY, T. D. **Moisture content of plywood.** *Veneers & Plywood, Indianapolis* 35 (8), 1941 (6–7). P.R.

With reference to the advantages of the modern use of hot pressing and resin adhesives, which practically eliminate the need for re-drying plywood after gluing.

33.15 : 33.03 : 12.26–8 (97). COX, H. A. **Notes on Empire and home-grown timbers.** *Emp. For. J.* 20, 1941 (73–4).

Tests indicate that the following species are unsuitable for the manufacture of good quality plywood:—*Ochrocarpus africanus* and *Pachylobus barteri* from the Gold Coast, Unien and Aghaki (*Xylopia* spp.), *Homalium alnifolium* and *H. dolichophyllum* from Nigeria, and *Carpinus betulus*, *Fraxinus excelsior* and *Quercus robur* grown in Great Britain.

33.15 : 33.03 : 12.26–8. ***Melaleuca leucadendron.*** *Emp. For. J.* 20, 1941 (81).

A test peeling of veneer from one bolt of this wood indicated that the plywood produced was not of sufficiently high quality to warrant further investigation.

33.15 : 33.8 : 31.27. PERRY, T. D. **Aircraft needs plywood.** *Sth. Lumberm.* 163 (2050), 1941 (28–30).

Newly developed techniques in the plywood industry make certain types of resin-bonded plywood especially adaptable to aircraft construction. These techniques, which are described briefly, include the making of high-density and variable-density plywoods and the plywood forming and moulding processes. Their successful development has been based on the new resin adhesives that are both waterproof and heatproof, and on certain normal plywood qualities such as high specific strength,

stiffness, a non-splitting quality, and distributed strength and almost negligible shrink and swell due to the wood elements in adjacent layers of veneer being at right angles.

33.17. Sawmilling

33.17 : 33.52 : 07.7. **Mechanical equipment for manufacture of cross ties.** *Sth. Lumberm.* 163 (2051), 1941 (52–4).

A detailed list is given of the equipment recommended to the 23rd annual meeting of the Railway Tie Association for the efficient manufacture of railway ties, together with a plan of a mill with and without edger, data on cost of equipment, necessary crew, and production and cost per 8-hour day.

33.19. Other Forms of Mechanical Conversion

33.19 : 33.06 : 34.6 : 33.7 : 76.1. BRATTON, A. W. **The production of hogged wood from Connecticut hardwoods.** *Tech. Note Ntheast. For. Exp. Sta.* No. 41, 1941. pp. 4.

An investigation was made into the factors affecting the efficiency of converting low-grade wood into a form suitable for burning in automatically stoked furnaces. Mixed hardwoods were used in 4-, 8-, and 12-ft. lengths and split when over 6 in. in diameter. The equipment included a hog, mounted on skids and operated by a petrol-powered, 100-h.p. motor. Results of the test showed that: (1) The operating cost of hogging 4-ft. sticks is higher than for either 8-ft. or 12-ft. sticks; (2) 73·5 cu. ft. of solid wood will produce one unit of 200 cu. ft. of hogged wood, and one stacked cord (128 cu. ft.) of 4-ft. wood will produce about one unit of hogged wood, while stacked cords of 8-ft. and 12-ft. wood produce proportionately lower yields; (3) the efficiency of the operation is affected by the way in which the equipment is placed. Suggestions are made for improving the equipment and its operation.

33.3. *Chemical Treatment*

33.3. SCHEUERMANN, H., and KLEIN, H. (to I.G. Farbenindustrie A.-G.) **Hardening of wood.** *German Patent* No. 688,266, Jan. 25, 1940 (Cl. 38*h*. 2.01). Chem. Abs. 35 (3792–4). P.R.

The wood is treated with liquid NH_3 or CH_3NH_2 under pressure and heat.

33.32. Pulp and Paper Manufacture

33.32 (73) : 09.4. RUNKEL, R. Die Zellstoff- und Papierwirtschaft der Vereinigten Staaten von Nordamerika und ihre Rohstoffgrundlage. **[The pulp and paper industry of the United States of North America and its basis in raw materials.]** *Z. Weltforstwirt.* 8, 1941 (259–304). [G.e.] [Reichsinstitut für ausländische und koloniale Forstwirtschaft.] P.R.

From a detailed examination of statistical matter it is concluded that:—(i) Although the pulp and paper production of the United States is the largest in the world, the vast and constantly increasing home consumption of these products makes the country largely dependent upon imports, particularly of unbleached sulphite pulp, newsprint, and pasteboard. (ii) Five main industrial regions can be recognized —the Lake States, New England, and Middle Atlantic regions, here designated as the 'classical' regions—and the Southern States and Pacific Coast regions, referred to as the 'new' regions. The structure of the regions differs according to their historical development: in the classical regions a large number of medium- and small-scale establishments is found, whereas large-scale establishments occur predominantly within the new regions. (iii) The continued threat of a shortage of raw materials has been moderated to some extent during the past 20 years by discoveries that have enabled fresh tree species to be utilized for pulp, but the effect of such advances has been outbalanced by increasing consumption and disregard for the principle of sustained yield, so that dependence upon imports—chiefly from Canada and Sweden—has actually grown. (iv) The cessation of imports from Sweden brought Canada into prominence as a possible source from which the demand might be covered. Canada, however, has also to consider the demand in Britain; furthermore, Canadians are reluctant to expand capacity to meet both of these demands, owing to uncertainty of what post-war conditions may be. (v) As it is already impossible for the United States to supply the wood requirements of its own pulp and paper industry at the present rate of consumption, the possibility of its becoming self-sufficient for the whole range of pulp products is rendered still more remote by the fact that large quantities of pulp and newsprint are

imported, in addition to pulpwood. Complete coverage of home consumption would necessitate an additional cut of 11–13 million cu. m. of wood, or 50 per cent. more than the present pulpwood production. (vi) Apart from the wood requirements of the industry, consideration must be given to the question whether and within what period it would be possible to raise capacity to the required extent, to secure labour, and to provide the necessary chemical raw materials, among which pyrites for the sulphite process and sodium sulphate for the sulphate process are of outstanding importance. Before the war, large quantities of sodium sulphate were imported from Germany. It is known that efforts were to be made to develop supplies of this chemical from Texas, but no report has been seen of the success or otherwise of these.

The account is illustrated with many graphs and tabular statements.

33.32 : 31.42.11 : 33.02 : 12.25. HOLZER, W. F. **Effects of heartwood decay in Western Hemlock on sulphite pulps.** *Paper Tr. J.* 112 (19), 1941 (38–40). [Crown-Zellerbach Corporation, Camas, Wash.] P.R.

Three samples of Western Hemlock (*Tsuga heterophylla*) heartwood representing three degrees of decay—ordinary sound, medium decay, and advanced decay—were cooked by a normal calcium-base sulphite cook. Comparisons were made after a constant cooking cycle. Density of wood decreased with decay, but yield per lb. of dry wood substance remained constant. The chlorine demand for bleaching increased with decay. Pulp colour became darker in the presence of decay. Physical and chemical analyses of the pulps showed evidences of degradation due to decay, but considering the wide variation of the samples, the deterioration of the fiber was less than might be predicted. Decrease in the rate of pulping as judged by bleachability and lignin content is apparently due to decreased solubility of lignin. *From author's summary.*

33.32 : 33.02 : 12.25. NAKAMURA, H., and TAKAUTI, E. **Cellulose: extraction from Red Pine.** *J. Cellulose Inst., Tokyo* 17, 1941 (19–26). Cotton Res. Summ. 21 (342). P.R.

Results of cooking *Pinus densiflora* wood with ethylene glycol.

33.32 : 33.02 : 12.25. HAFFNER, L. C., and KOBE, K. A. **Douglas Fir as a pulpwood: modified sulphate pulping process for chemical pulp.** *Paper Tr. J.* 112 (24), 1941 (27–8). [University of Washington, Seattle.] P.R.

Preliminary experiments on the pulping of Douglas Fir by a modified sulphate process indicate that it is possible to produce a high alpha-cellulose pulp from waste wood or low-grade logs of this species.

33.32 : 34.6. PANGARA HOLDING CORPORATION, LTD. **The production of chemical wood pulp.** *British Patent* No. 527,415, Oct. 8, 1940. pp. 4. P.R.

Specification of a method of producing wood pulp suitable for the manufacture of white paper from unbarked trimmings, prunings, and other woody material of small diameter ranging from approximately 1½ in. downwards.

33.32 : 34.6. AGUILAR, L. A. **A preliminary study of ligno-cellulose plastic from sawdust of some Philippine woods.** *Philipp. J. For.* 4, 1941 (15–26). [Bureau of Forestry, Philippines.]

From this study it appears that good wood plastics can be produced from the sawdust of Philippine woods using the technique worked out by the U.S. Forest Products Laboratory for the manufacture of wood plastics from Maple. However, details of an optimum procedure for each of the common Philippine species have yet to be determined.

33.36. Preservation of Wood. Seasoning and Drying

33.36. GIBSON, A. J. **Wood and its preservation by means of paint and varnish.** *Emp. For. J.* 20, 1941 (39–49). [London Shellac Research Bureau.]

A historical sketch of the development of various protective coatings used for treating wood surfaces, with notes on the substances used in their manufacture and on methods of application.

33.36.1. *Preservation against Attack by Plants and Animals*

33.36.1 : 07.7. ATLASMASTE KOMM.-GES. HERMANN GEWECKE. **Impregnating round lumber with wood-preserving liquids.** *German Patent* No. 695,625, Aug. 1, 1940 (Cl. 38*h*. 2.01.) Chem. Abs. 35 (5670). P.R.

The top of the tree is connected to a vacuum to suck out the tree sap. The preservative enters through the foot of the trunk under slight pressure. Apparatus is described.

33.36.1 : 12.21 : 38.2 : 31.42.11. CARTWRIGHT, K. ST. G. **Dry rot outbreak after fire. Damage and how it can be prevented.** *Builder, Lond.* 159, 1940 (291). R.A.M. 20 (389).

Attention is drawn to the likelihood of an increase in attacks by *Merulius lacrymans* as a consequence of the soaking of woodwork during fire-fighting operations. Essential precautions to minimize this danger include the preliminary waterproofing of roofs before proceeding with further repairs; removal of all floor coverings that retard the escape of moisture, and of damp-insulating material between floors and ceilings; and provision of adequate ventilation combined with a warm atmosphere.

33.36.1 : 33.31. **Determining penetration of wood preservatives.** *Tech. Note For. Prod. Lab., Wis.* No. 163, (revised ed.) 1940. pp. 2. P.R.

Penetration of creosote and dark-coloured oils can be checked by direct examination of sample borings. That of zinc chloride and chromated zinc chloride is determined by spraying a freshly cut surface or boring with a mixture of equal parts of 1-per-cent. potassium ferricyanide solution, 1-per-cent. potassium iodide solution, and 5-per-cent. soluble-starch solution, the treated wood giving a dark blue coloration. To detect sodium fluoride, two separate solutions are made: (i) 5 g. zirconium oxychloride in 500 c.c. water; (ii) 2 g. sodium alizarine sulphonate, 40 c.c. concentrated hydrochloric acid, and 460 c.c. water. These must be kept separately until needed for use, when one part of solution (ii) is added to an equal part of solution (i) (but not *vice versa*). On applying this mixture to freshly exposed faces the treated wood turns yellow and the untreated wood dark red. Mercuric chloride in wood can be detected by applying hydrogen sulphide solution, which turns the treated area black. In sampling for penetration a sufficient number of tests should be made to give a fair average.

33.36.1 : 33.31. **Wood preservatives.** U.S. Forest Products Laboratory, Madison, Wis. No. *R*149, (revised ed.) 1941. pp. 11. P.R.

The properties required of preservatives are briefly discussed and short notes are furnished on coal-tar creosote, crystal-free coal-tar creosote, carbolineums, water-gas-tar creosote, wood-tar creosote, tar, creosote/coal-tar solutions, petroleum oils, creosote/petroleum solutions, zinc chloride, chromated zinc chloride, sodium fluoride, arsenic, copper sulphate, mercuric chloride, clean non-swelling preservatives such as the chlorinated phenols, proprietary preservatives, paints and varnishes, and water repellents.

33.36.1 : 33.31. HARVEY, J. E. (50 per cent. to Southern Wood Preserving Co.) **Materials for preserving wood.** *U.S. Patent* No. 2,241,400, May 13, 1941. Chem. Abs. 35 (5278). P.R.

A process for increasing toxicity in a mixture of tar fractions with an original boiling point mainly above 270°.

33.36.1 : 33.31. DEUTSCHE SOLVAY-WERKE A.-G., ZWEIGNIEDERLASSUNG ALKALIWERKE WESTEREGELN. **Wood preservative.** *German Patent* No. 691,856, May 9, 1940 (Cl. 38*h*.3). Chem. Abs. 35 (4178). P.R.

Chloronaphthalene with the addition of stearic or palmitic acid or their salts and resins, waxes, cellulose esters or drying oils are used. The additional substances should be present in such amounts as to prevent volatilization of the chloronaphthalene.

33.36.1 : 33.31. KLEIN, H. **Wood preserving.** *German Patent* No. 695,812, Aug. 1, 1940 (Cl. 38*h*. 2.01.) Chem. Abs. 35 (5670). P.R.

The wood is coated with two layers: the first is an ammoniacal solution of $CuSO_4$ 5 per cent., NaF 1·5–2 per cent., Na arsenate 1 per cent., and $K_2Cr_2O_7$ 0·5–1 per cent.; this is followed by a coat of waterglass containing $K_2Cr_2O_7$.

33.36.1 : 33.31. BOARDMAN, A. D. (to Celcure Corp.) **Preserving wood by use of salts such as acid copper chromate solutions.** *U.S. Patent* No. 2,235,822, Mar. 25, 1941. Chem. Abs. 35 (4178). P.R.

Apparatus is described, and a process of preserving wood by causing a chemical reaction in its pores to form an insoluble metallic compound from a solution of soluble metallic salts precipitable by heat.

33.36.1 : 33.31 : 31.42.12. INDIA. **Forest research in India and Burma, 1939–40. Pt. I.—The Forest Research Institute, Dehra Dun.** Manager of Publications, Delhi. 1941. pp. 133.

In tests of Santobrite, 4-per-cent. zinc chloride, 3-per-cent. borax and 8-per-cent. sodium bicarbonate to prevent sap stain and mould on *Bombax malabaricum*, *Ailanthus grandis* and *Pinus longifolia*, Santobrite gave best results in all cases (p. 55).

33.36.1 : 33.31 : 31.43 : 13.2. SNYDER, T. E., and ZETEK, J. **Test house on Barro Colorado Island resists termites and decay.** *Wood Pres. News* 19, 1941 (80–2). [Bureau of Entomology & Plant Quarantine, U.S.D.A.] P.R.

A small frame building was constructed in 1926 on Barro Colorado Island, Canal Zone, from treated Southern Yellow Pine. The foundations and framework were of timbers impregnated with coal-tar creosote, 12 lb. full-cell, and 8 lb. empty-cell pressure treatments, respectively. The remaining woodwork and furniture was impregnated with ½ lb. zinc chloride per cu. ft., and the insulation or fibre-board ceiling received a light surface coating of 1-per-cent. chlorinated naphthalene. The treated woodwork was kept painted during the test period. At the last examination, in August, 1940, there had been no damage to the treated wood by either termites or decay, though shelter tubes of *Nasutitermes cornigera* and *Coptotermes niger* had been observed on the surface of the wood in various places. During 1935–7, however, a stingless bee (*Trigona* sp.) and termites caused damage to the ceiling, from which some of the chlorinated naphthalene had been leached as a result of leaks in the roof. Additional wallboard, treated with chromated zinc chloride to retain 0·42–2·23 lb. of the dry salt per cu. ft., was installed in 1937 and has so far shown no attack, though it is too early to draw any conclusion on the effectiveness of this treatment. It is emphasized that the ability of termites to construct shelter tubes on treated wood surfaces enables them to enter and attack any untreated material inside the building.

33.36.1 : 33.36.3 : 31.42.12 : 12.26–8 : 12.21. DESPEISSIS, J. L. **A preliminary investigation of blue-stain in 'Kauvula' timber.** *Agric. J. Fiji* 12, 1941 (23–5). R.A.M. 20 (285).

Kauvula (*Endospermum* spp.) timber, used for making butter boxes, is commonly affected under Australian conditions by blue stain due to *Ceratostomella* spp. As timber with a moisture content under 20 per cent. of its dry weight is unaffected, the timber is steamed to expedite seasoning as well as deodorization. At the Walu Bay timber yard it is standard practice to treat the material with a cold solution of 5-per-cent. borax for several seconds. This gives moderately satisfactory results, but blue stain still occurs to some extent.

33.36.1 : 33.53. UNITED STATES. **Forest research: 1940. Pacific Northwest Forest and Range Experiment Station.** Portland, Oregon. [1941.] pp. 26.

Experimental tests indicate that the application of an arsenic paste preservative, which can be applied cheaply to unseasoned telephone poles, will double the effective life of decay-susceptible woods (p. 11).

33.36.2. *Fireproofing*

33.36.2. BRYAN, J. **The protection of structural timber against fire and incendiary bombs.** *Repr.* from *Fire Protection & A.R.P. Review* Aug., 1941. pp. 2. [Forest Products Research Laboratory, Princes Risborough, Bucks.]

Note on the treatment of new timber and of timber *in situ*.

33.36.2. KLEECK, A. VAN. **Fire-retardant synthetic-resin paints.** *News Edition, American Chemical Society* 19, 1941 (626–8). [Forest Products Laboratory, Madison, Wis.] L.S.

The ability of some synthetic resins to produce a voluminous char on exposure to heat offers the hope that a superior fire-retardant coating can be developed from such materials. Additional research is necessary to standardize conditions of preparation of ethylidene urea-formaldehyde preparations so that reproducibility of results can be obtained and to improve flexibility and stability of the coatings. Results obtained with the resins studied suggest that other resins may have similar properties, and durable, practical resin coatings of high fire-retarding effectiveness may ultimately be found. *Author's summary.*

33.36.2 : 33.31. **Fire-retardant paints containing borax.** *Tech. Note For. Prod. Lab., Wis.* No. 249, 1941. pp. 4.

Fire-retardant paints so far developed afford protection against small fires and are for interior use only, where appearance is not of major importance. Formulae for tested paints and methods of preparation are given. For fire-retarding effectiveness the borax should make up at least 25 per cent. of the paint, by weight, and pigments should be included to provide other desirable qualities. Heavy applications—at least 8 gal. per 1,000 sq. ft.—are necessary for maximum fire protection.

33.36.2 : 33.31. DRAPER, C. R. **Fire-preventing paints.** *Paint Manuf.* 11, 1941 (75–7). Chem. Abs. 35 (5329). P.R.

There are three main lines of approach to the problem:—(i) the use of incombustible coatings such as water glass or Si ester; (ii) substances melting at high temperatures to form coverings impervious to air and O; and (iii) substances that decompose at high temperatures with evolution of gases, such as Cl, NH_3, CO or SO_2, NH_4 compounds and chlorinated organic compounds, such as chlorinated paraffin wax, rubber, resins and oils. Na silicates are the predominant binding media, and pigments are confined largely to lithopone and $CaCO_3$. A Si ester consists, in an organic solvent, of a mixture of colloidal SiO_2 and Et silicates. Expense, and the existence of a certain amount of fire risk during application, are disadvantages of the latter. Several patented mixtures and chlorinated compounds and cellulose derivatives are outlined.

33.36.3. *Seasoning. Drying*

33.36.3. TORGESON, O. W. **Why the drying time of a kiln load of lumber is affected by air velocity.** *Sth. Lumberm.* 163 (2051), 1941 (58–9). [Forest Products Laboratory, Madison, Wis.]

Kiln-drying experiments with 1-in. by 8-in. Red Oak indicated that lateral spacing of the boards reduced the drying time, as compared with that for close-packed piles, with relatively low air velocities (100 ft. per minute), that such spacing was not beneficial with an air velocity of 600 ft. per minute and possibly would not be beneficial with higher velocities, and that in relation to the drying time, the optimum air velocity for the early stages of kiln drying green, 1-in. Red Oak appears to be at least 500–600 ft. per minute.

33.36.3. TORGESON, O. W. **Function and calculation of ventilation in drying compartments.** U.S. Forest Products Laboratory, Madison, Wis. No. *R*1265, 1941. pp. 3 + gphs. & tbl. P.R.

33.36.3. TORGESON, O. W. **Simplifying the calculation of the quantity of air required in kiln drying lumber.** U.S. Forest Products Laboratory, Madison, Wis. No. *R*1266, 1941. pp. 4 + gph. P.R.

33.36.3 : 07.7. **A cross-shaft overhead fan kiln.** *Leafl. For. Prod. Res. Lab.* No. 18, 1941. pp. 4. [Forest Products Research Laboratory, Princes Risborough.]

In the single-stack kiln described, metal constructional parts, and consequently the labour and skill involved in erecting these, are reduced to an absolute minimum; moreover, the design is such as to ensure an exceptionally strong air movement for a comparatively small power consumption. To accomplish this, larger, and hence more efficient fans are employed than in the double-stack pattern previously described (in *Leaflet* No. 10), and fan boxes, steel joists, deflectors, etc., are almost entirely eliminated. Owing to the increased air speed obtainable between the rows of timber in the pile, and the complete reversibility of the circulating air system, it has been considered possible to increase the pile width from 6 to 7 ft. without detriment to the drying of the load as a whole.

33.36.3 : 12.26–8. RIETZ, R. C. **Estimated footage reduction in kiln-drying air-dried hardwoods.** *Sth. Lumberm.* 163 (2049), 1941 (58–9). [Forest Products Laboratory, Madison, Wis.]

The volume reduction brought about when air-dried boards are kiln dried to a lower moisture content varies according to species, moisture change while kiln drying, whether stock is plain or quarter sawn, and the distribution of widths and lengths of boards in a particular consignment. As these factors vary widely it is difficult to estimate the reduction for any average moisture change from available average shrinkage data. From a study of measurement tallies of car loads of various species of Appalachian hardwoods, in which the distribution of board widths and lengths tended to be similar, the volume reduction for car lots of plain-sawn stock was estimated, assuming kiln drying to a moisture content of 5 per cent. from an air-dried condition of 18 per cent., and a relationship is shown between the estimated reduction and the known tangential shrinkage from green to oven-dried moisture content for 28 important hardwood species.

33.36.3 : 12.26–8. TORGESON, O. W. **The [kiln-] drying rate of Sugar Maple as affected by relative humidity and air velocity.** U.S. Forest Products Laboratory, Madison, Wis. No. *R*1264, 1940. pp. 8 + gphs. P.R.

33.36.3 : 33.06. ERIKSSON, J. Effectiv metod för lufttorkning av ved. [**Effective method**

for air drying fuelwood.] *Skogsägaren* 17, 1941 (96). [Sw.]

Racks of the type commonly used in Sweden for drying hay are wired together at the top in twos, so that each pair forms an inverted V space which provides ventilation. The paired racks are then placed side by side, and the fuelwood is piled in the troughs formed between each adjacent pair of racks. Using this method of piling, fuelwood cut into small billets and piled in February–March was ready for use in May. If the wood is piled early, the racks are clear again by the time they are needed for haymaking. The arrangement is illustrated by a diagram.

33.36.3 : 33.31. HILL, D. F., MOTTET, A., and LOUGHBOROUGH, W. K. **A primer of chemical seasoning.** *Chemical Seasoning, Progress Report* No. 1. West Coast Lumbermen's Association, Stuart Bldg., Seattle, Wash. [1941?]. pp. 22. [W. Coast Lumbermen's Association.] T.D.A.

A semi-popular bulletin devoted chiefly to an explanation of the theory of chemical seasoning. The main headings are:—How ordinary lumber dries; why lumber checks; how chemicals prevent checking; the choice of a chemical; properties of chemically treated wood; chemical seasoning procedure; cost of treatment; and mill experience with chemical seasoning. An appendix specifies the recommended practice for securing the best results from urea applied by the dry-spreading process. In the text is included a comparative table of 30 different chemicals rated according to price, water-retention and anti-shrink value, and degree of use permitted by other important properties such as corrosiveness, colour, fire hazard and fire retardance, liability to induce condensation of atmospheric moisture, electrical conductivity, and toxicity. It is stressed that the field of chemical seasoning is a new one offering wide scope for further research.

33.36.3 : 33.31. PECK, E. C. **Chemical seasoning of wood. Hygroscopic and anti-shrink values of chemicals.** *Industr. Engng. Chem.* (*Industr. Ed.*) 33, 1941 (653–5). [Forest Products Laboratory, Madison, Wis.] L.S.

Desirable and undesirable characteristics of chemicals in relation to their use for treating wood are discussed. Results are presented of experiments to determine the relative humidities at 65° F. over solutions of various chemicals, singly or in mixture, and at different concentrations, and to measure the shrinkage reduction effected by impregnating wood with such chemicals. Of the substances and mixtures tested those showing most promise for chemical seasoning of wood were urea, invert sugar, and a mixture of the two.

33.36.3 : 33.31 : 33.53 : 12.25. **Chemical treatment prevents checking of Cedar poles.** *W. Cst. Lumberm.* 68 (9), 1941 (48).

The spraying of freshly peeled green poles of Western Red Cedar with a saturated solution of urea, before drying to a moisture content of about 23 per cent., effectively minimized checking, the amount of urea required being about 0·13 lb. per linear ft. of a pole 12 in. in diameter.

33.36.3 : 33.8. TORGESON, O. W. **Technique of developing a drying process for small stock.** U.S. Forest Products Laboratory, Madison, Wis. No. *R*1263, 1940. pp. 5. P.R.

A report on preliminary experiments with the crib method for drying Cocobolo knife-handle blanks.

33.37. Distillation. Manufacture of Tar

33.37 : 33.38.1 : 33.32 : 33.39 (45). FERRARI, P. V. **Theoretical considerations and practical possibilities of the Italian industry of wood treatment.** *Chim. ind. agr. biol.* 15, 1939 (779–87). Chem. Abs. 35 (4575). P.R.

The dry distillation of several woods is described, and data are given on the charcoals, tars, and gases obtained. The extraction of cellulose, saccharification, and CH_4 fermentation of these woods is examined.

33.38. Charcoal Manufacture. Use of Wood and Charcoal in Producer-Gas Generators

33.38.1. INDIA. **Forest research in India and Burma, 1939-40. Pt. I.—The Forest Research Institute, Dehra Dun.** Manager of Publications, Delhi. 1941. pp. 133.

Experiments have shown that more binder and water are necessary to make good briquettes from soft charcoal, as obtained from woods like *Cryptomeria japonica*, than when using the denser charcoals from timbers such as *Shorea robusta*, and that briquettes from both types of wood appear to be equally good (p. 70).

33.38.1 : 12.14.5 : 12.26–8. **[Manufacture of charcoal briquettes from tree foliage.]** *Chem. Fabrik* 14, 1941 (108). Fuel Res. Summ. 1941 (683). P.R.

Experiments have been initiated in France with a view to utilizing the foliage from Chestnut and Plane trees for the manufacture of ovoid briquettes. The leaves are carbonized in a special furnace with a capacity of 700–800 kg. After 5–6 hours 300–350 kg. of powdered carbon are obtained, from which briquettes can be made. This process is to be developed on an industrial scale.

33.38.1 : 33.38.2 (941). **Planning of charcoal supplies with special reference to the position in Western Australia.** *Aust. Timb. J.* 7, 1941 (318, 321, 323).

In June, 1941, the various State Governments of Australia were approached by the Commonwealth Government with a request that they should undertake the responsibility for ensuring adequate charcoal supplies within their own borders. This seems now to have been generally accepted as a State responsibility, with some action being taken to co-ordinate and stimulate the work by the appointment of a Federal co-ordinator of charcoal supplies. The generally accepted position is that State production of charcoal will supplement rather than compete with private enterprise, and will represent a comparatively small proportion of total requirements. This is at present the position in Western Australia, State production over the last twelve months being little more than sufficient for Government requirements. While expansion of State activities is proposed, production for the coming year will not represent more than 10 per cent. of total requirements. The essential conditions of rational planning of charcoal supplies are (1) an estimate of the number of producer-gas units likely to be fitted in any given period; (2) a census, brought up to date at frequent intervals, of producer-gas units in operation; and (3) a register of charcoal manufacturers, with provision of monthly returns of production and stock. These data are now being collected in Western Australia. The plans of the Forests Department have been based on an estimate of 6,500 producer units in operation by June, 1942, including an estimated number of 2,500–3,000 units operating at the end of June, 1941. The total rate of charcoal production called for by June, 1942 on this estimate is about 37,000 tons. A fairly complete list of charcoal burners is available, but it is almost impossible to get reliable production figures without some statutory authority, which is as yet non-existent. Over 90 per cent. of charcoal production in Western Australia is by the meiler (mound or beehive) method or by pit burning. The Forests Department uses portable metal kilns, which generally yield cleaner charcoal, but owing to the relatively high capital cost involved, rapid expansion in their use by private enterprise cannot be expected. An externally fired retort with an estimated capacity of 30 tons of charcoal per week is being set up near Perth by a private company. Another company will probably proceed at an early date to install a plant for briquetting sawdust charcoal. The initial output proposed is 40 tons of briquettes per week. In the opinion of the Forests Department, one of the most practical methods of encouraging small producers is to fix reasonable prices on a regional basis.

33.38.1 : 34.6. ARNOT, D. B. **Charcoal from sawmill wood-waste.** *Malay. For.* 10, 1941 (98–101).

An illustrated account is given of the construction and operation of crude charcoal kilns used in Malaya to dispose of sawmill offcuts. Notes are included on the species used, kiln output, and methods of payment for labour.

33.38.1 : 98 (82). La Corporación Argentina de Productores de Carbón Vegetal. **[The Argentine Corporation of Vegetable Charcoal Producers.]** *Maderil* 13 (155), 1941 (1–2). [Span.]

This State-subsidized Corporation has been created by a recent Government decree to co-ordinate the production and marketing of charcoal and generally to assist the industry, which has been in a critical position for some years. The buying-up of temporary surpluses is one of the principal policies envisaged. The required funds have been advanced in the form of credits by the National Bank.

33.38.3 : 33.06 (931). NEUBAUER, L. G., and RANDS, M. B. **Activated carbon from char, Coconut charcoal, and wood charcoals.** *N.Z. J. Sci. Tech.* 22, 1940–41 (216B–224B). [Dominion Laboratory, D.S.I.R.] L.S.

Low-temperature char [carbonized non-coking coal], Coconut charcoal, and charcoals from the native woods Maire [? *Olea* spp.], Tawa [*Beilschmiedia tawa*], Matai [*Podocarpus spicatus*], Miro [*Podocarpus ferrugineus*], and

Manuka [*Leptospermum scoparium*], have been activated by steaming at high temperatures. Coconut charcoal, and possibly some of the wood charcoals, may be used for the production of active carbon, but under the conditions of the test low-temperature char did not prove suitable. *Authors' summary.*

33.39. Manufacture of Sugar, Oils, Alcohol, and Vinegar from Wood

33.39. NISIDA, K. **Oils from the residue of saccharification of wood.** *Japanese Patent* No. 134,257, Jan. 17, 1940. Chem. Abs. 35 (5290). P.R.

33.39. HASCHE, R. L. (to Eastman Kodak Co.) **Saccharification of wood.** *U.S. Patent* No. 2,239,095, Apr. 22, 1941. Chem. Abs. 35 (4952). P.R.

Apparatus is described, and a process that involves wetting pieces of wood with dilute HCl so that the water present is at least 12 per cent. of the dry weight of the wood, treating the mass with a mixture of liquefied SO_2 and liquefied anhydrous HCl in an amount sufficient to increase the strength of the HCl in the wood to at least 50 per cent., the SO_2 being allowed to evaporate off, thereby absorbing heat from the solution of HCl in the moisture of the wood and lowering the temperature of the mass to that at which no carbonization of the cellulose present will occur, alternately pumping cold HCl gas under pressure into the mass and releasing the pressure a plurality of times, and subsequently allowing the mass to stand until the cellulose of the wood has been substantially converted into sugar.

33.7. *Firewood*

33.7 : 07.7. SEELEY, L. E., and KEATOR, F. W. **Wood-burning space heaters: a report on preliminary tests of units designed especially for burning wood.** *Mech. Engng., N.Y.* 62, 1940 (864–70). [Yale School of Engineering, Yale University.] L.S.

It is pointed out that scarcely any engineering research appears to have been devoted to domestic stoves, though improvements in the design of wood-burning stoves should aid the conservation programme by creating a better market for fuelwood from thinnings and logging or mill refuse. The desirable requirements of wood-burning stoves are outlined and results are given of performance tests with an American and a European type of stove. Both of these were easy to handle, needed little attention, were able to hold a fire for long periods, and showed good efficiencies. Observations are included on the processes involved in burning wood in such stoves.

33.7 : 07.7. AXMACHER, M. Intermittent eldning med ved i värmeledningspannor. **[Intermittent combustion of wood in central-heating boilers.]** *Skogsägaren* 17, 1941 (117–9). [Sw.]

The chief obstacle to the use of wood as a boiler fuel has been the necessity of maintaining a lively fire to reduce the formation of tarry substances that choke the flues. Two devices are now available to eliminate this difficulty, both working on the same principle of intermittent burning. The first is a thermostatically controlled fan [cf. *For. Abs.* 2 (235)], which gives accurate control of temperature but is rather expensive; the second is a simpler and cheaper device known as the 'Snappregulator', which relies on the natural draught and is coupled to the draught-regulating parts of the furnace. Both devices produce alternating periods of brisk combustion when the draught is in operation, and extremely slow combustion when the draught is completely cut off.

33.7 : 07.7 : 33.38.2. Ny Parcapanna: Svenska Järnvägsverkstäderna lanserar en gengaspanna för värmeledningar. **[New 'Parca' boiler: Svenska Järnvägsverkstäderna put out a producer-gas boiler for central heating.]** *Skogsägaren* 17, 1941 (123–4). [Sw.]

Constructional details are given of the 'Parca Generatorpanna', a new type of central-heating boiler working on the producer-gas principle. The apparatus is produced by Svenska Järnvägsverkstäderna, of Linköping. A similar but larger model is being manufactured for use in industry. The account includes an illustration and sectional diagrams.

33.8. *Other Manufactured Products*

33.8 : 31.0 (94). **Australian timbers for use in aircraft.** *Aust. Timb. J.* 7, 1941–42 (259).

Considerable quantities of Alpine or Mountain Ash (*Eucalyptus* spp.) timber are being used as a substitute for English Ash. The former are superior to the latter in all important properties and in addition are lighter in weight. Substitutes for imported Spruce, Lime and Balsa are being investigated.

33.8 : 31.0 (94). **Timbers for mauls and mallets.** *Mon. News Lett. Div. For. Prod. Aust.* No. 114, 1941 (2–3).

Australian species that are suitable for these uses are noted.

33.8 : 31.0 (94). **Uses of Australian timbers: handles.** *Mon. News Lett. Div. For. Prod. Aust.* No. 116, 1941 (2).

Australian timbers in use for various tool and implement handles are listed.

33.9. *Grading and Storage of Converted Timber*

33.91 : 12.25 (410). **British standard grading rules for structural timber. The 800 lb. f. grade Redwood [*Pinus sylvestris*], Scots Pine [*P. sylvestris*], European Larch [*Larix decidua*] and Douglas Fir (home-grown) [*Pseudotsuga taxifolia*].** *British Standard* No. 940, 1941. pp. 12. P.R.

33.91 : 33.8 : 12.26–8. **Oak flooring (exports).** *Commercial Standard* CS56E–41. U.S. National Bureau of Standards, Washington, D.C. 1941. pp. 10.

33.91 : 98.3. **Rules for the measurement and inspection of hardwood lumber, Cypress, veneers and thin lumber.** National Hardwood Lumber Association, Chicago. 1941. pp. 103.

33.91 : 98.3. **Hardwood dimension lumber (exports).** *Commercial standard* CS60E–41. U.S. National Bureau of Standards, Washington, D.C. 1941. pp. 13.

34. MINOR FOREST PRODUCTS AND THEIR UTILIZATION

34.2. *Vegetable Products*

34.24. Tanning Materials. Cork

34.24 : 12.25 : 32.25.5. L[OTHIGIUS], W. Tillvaratagandet av granbark till garvämne. [**Utilization of Spruce bark as a tanstuff.**] *Skogsägaren* 17, 1941 (127–8). [Sw.]

Brief practical directions are given for stripping, drying, and preparing chipped Spruce bark for tanneries. The yield of prepared chips is about 40 kg. per stacked cu. m. of wood, and the price obtained for such chips is at least 7 öre per kg.

34.24 : 12.26–8. SHUTTLEWORTH, S. G. **The story of Wattle (or Mimosa): the world's modern tanning material.** *Sci. Bull. Dep. Agric. For. S. Afr.* No. 168, 1941. pp. 28. [Leather Industries Research Institute, South Africa.]

A brief survey of the development and use of Wattle (*Acacia* spp.) as a tanning material.

34.24 : 12.26–8 : 98 (68). CRAIB, I. J. **South African Wattle bark and Wattle extract with special reference to the American market.** *J. S. Afr. For. Ass.* 6, 1941 (71–88).

A brief review of the Wattle-bark industry with particular reference to silvicultural practices that give highest yields, the grading of Wattle bark, competitive tanning materials and the comparison of Wattle with other vegetable tans, and the trade in Wattle bark, especially that with the U.S.A. Practically all of the bark exported from South Africa at present is from the Black Wattle (*Acacia mollissima*).

34.24 : 12.26–8 : 2 : 3 : 98.1. RADIŠIĆ, J. *Quercus suber* L. (Chêne-liège). [***Quercus suber* L. (The Cork Oak).**] *Šumarski List* 64, 1940 (111–67). [Croat.f.] L.S.

A general review is presented of literature (47 references) on the history, taxonomy, biological requirements, cultivation, and utilization of the Cork Oak.

34.24 : 34.26 (67.6 : 67.8 : 68.9). GREENWAY, P. J. **Dyeing and tanning plants in East Africa.** *Bull. Imp. Inst., Lond.* 39, 1941 (222–45). [E. African Agricultural Research Sta., Amani.]

A list is given, in alphabetical order of botanical names, of 260 native and introduced species in East Africa that are potential sources of dyes and tannins, with an indication of the countries in which they occur. Little commercial interest has yet been shown in the natural dyestuffs of the region, and only Wattle and Mangrove bark have at present any commercial importance as sources of tannin.

34.24 : 12.25 : 12.14.8. LITTLE, E. L. **Some preliminary notes on southwestern corky barks.** *Res. Rep. Sthwest. For. & Range Exp. Sta.* No. 3, 1941. pp. 11.

Three species of conifers from the southwestern United States have sufficient cork in their outer barks to be considered as possible emergency sources of commercial cork. Cork-bark Fir (*Abies arizonica*) has an outer bark of pure, soft cork usually less than ¼ in. thick. A limited supply of this could be obtained by stripping dead trees and possibly living trees not more than 1–1½ ft. in diameter. Douglas

Fir has a thick outer bark which contains nearly three-quarters or more cork. A large supply of bark of this species could be obtained easily and cheaply from sawmills. White Fir (*Abies concolor*) has outer bark similar to that of Douglas Fir but averaging only about one-half cork. *From author's summary.*

34.25. Christmas Trees. Decorative Branches. Medicinal Plants

34.25 : 12.25. **Treating Spruce and Balsam Fir Christmas trees to reduce fire hazard.** *Tech. Note For. Prod. Lab., Wis.* No. 250, 1941. pp. 3.

The most satisfactory treatment was to cut off the base of a recently felled tree at least 1 in. above the original cut, stand the tree in a container of water and maintain the water level above the cut surface.

34.25 : 12.11.15. WORLEY, C. L., and GROGAN, R. G. **Defoliation of certain species as affected by α-naphthaleneacetic acid treatment.** *J. Tenn. Acad. Sci.* 16, 1941 (326–8). [University of Georgia, Athens.] L.S.

Treatment with a 0·01-per-cent. solution of α-naphthalene-acetic acid delayed defoliation of cut branches sufficiently to be of commercial value for short-distance shipments of *Euonymus* sp. and long-distance shipments of *Ilex opaca*. No significant results were obtained for *Quercus virginiana*. *Magnolia grandiflora* reacted similarly to *Euonymus*, and results for a horticultural variety of *Pinus strobus* were not significant. The last two species, however, retain their leaves for a long period even in the untreated state.

34.25 : 12.25 : 06.3. RAIZENNE, H. **An improved method in the preservation of coniferous foliage for exhibition purposes.** *Rep. ent. Soc. Ont.* No. 71, 1941 (51–2). [Department of Agriculture, Ottawa.] I.I.E.

A pickling solution is made up of 65 parts of ethylene glycol, 34 parts of water, and 1 part of carbolic acid or formaldehyde. Fresh foliage is placed in this for 2 weeks, after which it is taken out, shaken gently to remove excess fluid, then dipped while still wet into a solution made up as follows:—4 full sheets of gelatine (30 sheets per lb.) are dissolved slowly in 12 oz. of cold water to which have been added a few drops of carbolic acid. If too thick for use, this solution can be thinned by warming slightly. The foliage is dipped once or twice and shaken between each dipping. After a few days the needles can be painted with oil colours; these should not be thick and should be applied from the base of the needle towards the tip. A few cubic centimeters of glycerine added in the dipping process will help to prevent the foliage becoming brittle.

34.25 : 12.26–8 : 21 : 23 : 12.11.2. GREENWAY, P. J. **Empire production of drugs. II—Camphor.** *E. Afr. agric. J.* 7, 1941–42 (20–3). [E. African Agricultural Research Sta., Amani.]

Notes on the cultivation of *Cinnamomum camphora* and the manufacture, uses, and price of natural camphor.

34.26. Resin. Turpentine. Oils. Dyestuffs

34.26 : 12.25 : 23.1 : 23.23.11 : 12.11.21 : 45 (91.2). VLIES, A. P. VAN DER. De Agathisbosschen in de afdeeling Poso. **[The *Agathis* forests of the district of Poso.]** *Tectona* 33, 1940 (616–40). [Du.du.e.]

Copal derived from *Agathis* is an important source of income for the sparse population of this district in the Residency of Manado, Celebes, though the mountainous character of the region makes much of the *Agathis* forest inaccessible and impedes transport. The existing stands, which are shown on a map together with the copal marketing centres, are classified as 'lowland *Agathis*' (*A. hamii*, *A. philippinensis*, or both), occurring below 1,000 m. altitude, and 'highland *Agathis*' (*A. philippinensis*), occurring above this level. In 1939 a regulation was issued for their protection, and, unless the population can prove forest rights, licences carrying certain obligations must now be obtained for tapping. For control purposes zinc number plates are given out with the licences and must be affixed to the trees. Trees tapped by native methods each yield 3–10 kg. of copal per annum; no standard tapping method is used and the tapped trees generally die. The best tapping method has yet to be discovered, but as the natives possess only 'chopping knives' a slanting cut is provisionally recommended. Better tapping methods and measures for rendering the forests more accessible would greatly increase production. The Forest Service has already been responsible for improving the quality of the copal. Natural reproduction is often met with and could doubtless be improved by freeing seed trees and taking proper care of the young growth. Seed has hitherto been hard to obtain, as trees

in the forest rarely bear cones. It has recently been found, however, that isolated trees often bear heavy cone crops, and with suitable measures it should prove possible to induce good seed production in forest trees and to secure enough seed for the establishment of plantations. Sound measures to expand the industry would greatly benefit the district.

34.26 : 12.26–8 : 21 : 23 : 24 : 11.47.1 : 12.11.21: 47 (54). LAURIE, M. V., and SEN GUPTA, J. N. **Notes on the cultivation of the Tung-Oil Tree (*Aleurites* spp.) in India.** *Indian For. Rec.* (*n.s.*) *Silviculture* 4, 1941 (133–59 + iv). [Forest Research Institute, Dehra Dun.]

This is a summary of the information available up to 1940 on the cultivation and utilization of Tung, with particular reference to India; experience in other countries is reviewed at the same time. Until recently, the whole world supply came from China, but for the past twenty years or so, much attention has been given to its cultivation elsewhere, above all in the southern United States of America (mainly in Mississippi) where no less than 175,000 acres is now carrying *Aleurites*.

In India, it was suggested that cultivation of the tree should be encouraged in the villages, especially forest villages practising shifting cultivation, but it is described in this *Record* as 'definitely a planter's crop, requiring an amount of tending, manuring and expenditure more typical of agricultural operations than forestry'. It is, however, suggested as possibly suitable for local development as a village industry but a warning is given that large extensions are a doubtful proposition on account of growing competition from synthetic materials and other more cheaply produced drying oils. The only extensive plantations are those of a private company in the Northern Shan States but few particulars are given.

Experiments in India began on a small scale in 1918 and were renewed in 1927. A fair degree of success has been obtained where rainfall is not below 30 in. (preferably 50–70 in.) and frost is absent or slight. The species are not exacting as regards soil but good drainage is desirable. *A. montana* does not thrive as well as *A. fordii* in the less tropical parts. Transplanting is generally preferred to direct sowing, though the latter is often successful. More or less manuring is usual, in many parts green manure being dug in, but deep working is inadvisable owing to the spreading root system. The usual spacing is about 25 ft. with 75 trees to the acre. It may be noted that *A. fordii* is a very variable tree with a number of recognized forms with characters of varying significance for economic plantations.

34.26 : 12.26–8 : 09.1 (81). SOUZA, B. J. DE. O pau-brasil na historia nacional. **[The Brazilwood Tree in national history.]** *Brasiliana, São Paulo* Ser. 5, Vol. 162, 1939. pp. 267. *Trop. Woods* No. 67, 1941 (38–9).

A historical account is given, covering more than three centuries, of the exploitation of the once important dyewood Pau-Brasil (*Caesalpinia echinata* Lamarck), from which the name of Brazil is derived. The tree is well on the way to extinction over the greater part of its former range, but is said to be most abundant at present near Niteroi and elsewhere in the State of Rio, in places in the south of Bahia, and in Alagoas. The wood is now chiefly of historical interest, though it is said to be especially esteemed for violin bows.

34.27. Seeds. Fruits

34.27 : 12.11.11 : 91.1. WAINIO, W. W., and FORBES, E. B. **The chemical composition of forest fruits and nuts from Pennsylvania.** *J. agric. Res.* 62, 1941 (627–35). [Pennsylvania Agricultural Exp. Sta.] O.R.E.

Chemical analyses are presented of the fruits and nuts of 35 tree and shrub species from Pennsylvania, and their nutritive value for wildlife is discussed.

34.6. *Utilization of Logging and Milling Waste*

34.6. **Wood flour: a general statement of the manufacture and use of wood flour and the status of the industry.** U.S. Forest Products Laboratory, Madison, Wis. No. *R*565, (revised ed.) 1941. pp. 5. P.R.

34.6. **Briquettes from sawdust and other wood waste.** *Wärme* 64, 1941 (252). Fuel Res. Summ. 1941 (572). P.R.

Silicates, pitch, or even clay may be used as binders. Small quantities of briquettes can be made by stirring 25–30 per cent. by weight of sawdust with a clay paste consisting of roughly equal proportions of clay and water, moulding by hand, and drying in the sun.

34.6 : 07.7. **Trash box unloader.** *W. Cst. Lumberm.* 68 (10), 1941 (15).

A note on equipment used in transporting

wood waste and trash from the mill to place of disposal, particularly on the details and operation of a mechanical unloader for lifting loaded clean-up boxes off narrow-gauge trucks, transporting them to the conveyor, dumping the contents into the conveyor and returning the empty boxes to the truck.

34.6 : 33.15 : 38.2. **Peeler core utilization.** *W. Cst. Lumberm.* 68 (7), 1941 (46).

The use of plywood core logs in house and fence construction.

38. FOREST CONSTRUCTIONAL WORKS. ENGINEERING

38.2 : 31.27. GOULD, J. J. **Experience in maintenance of large timber structures.** *Engineering News-Record, New York* 125, 1940 (240–2). L.S.

Results from inspections of heavy timber constructions in temporary exhibition buildings at San Francisco are discussed with particular reference to checking and shrinkage. Heavy trusses constructed with modern timber connectors suffered far less from checking and other shrinkage effects than did the older rod-and-block type of truss. As the buildings were temporary, they were designed for timber unit stresses 30–100 per cent. greater than normal, and in view of the fact that their performance was generally satisfactory, it is suggested that, when competent engineers design and supervise construction and maintenance, building codes might be relaxed to allow of stresses up to 100 per cent. in excess of those usually permitted. Further information is needed, however, on wind loads and other occasional forms of loading.

38.2 : 32 : 07.7. SUTHERLAND, J. W. **Depot buildings to build and maintain equipment.** *Pulp Paper Mag. Can.* 42, 1941 (480–2). [Canadian International Paper Co.]

Discussion of the equipment and buildings, including garage, blacksmith and workshop, required for maintenance and repairs of transport on a logging operation.

38.2 : 33.36. **Making log cabins endure: suggestions on preservatives, chinking, and exterior and interior finishes.** U.S. Forest Products Laboratory, Madison, Wis. No. *R*798, (revised ed.) 1941. pp. 12. P.R.

38.3 FLATT, F. L. **Construction of a truck track.** *Pulp Paper Mag. Can.* 42, 1941 (541–3). [Spruce Falls Power & Paper Co.]

The construction of a plank track for truck transportation on a logging operation is described. The track has given satisfactory service for two seasons under claybelt conditions in northern Ontario and indications are that with a reasonable amount of maintenance it should last for ten years. The material used in the track was Spruce and Poplar, 4 in. × 7 in. and 4 in. × 8 in. for treads, 4 in. × 5 in. for cross braces, quartered logs for curbs and 1 in. salvage lumber. Curbs and treads were 16 ft. long. The cost was $1,250.00 per mile.

38.3. KEENEY, W. D. **Some notes on highway timber trestle design.** *Wood Pres. News* 19, 1941 (73–9). P.R.

4. FOREST INJURIES AND PROTECTION

42. INJURIES FROM INORGANIC AGENCIES, EXCLUDING FIRE

42 : 12.25 : 21.3. SIDKI, I. **Notes on the death of Stone Pine at Salamis.** *Forest Treasures, Nicosia* 2 (4), 1940 (25–8).

Examination and analysis of the soil following the sudden death of established trees of *Pinus pinea* showed calcium carbonate to be present in concentrations increasing with depth of soil from 6 in. to 5 ft. and a calcareous hard pan at 5 ft. through which roots could not penetrate. It is suggested that three factors contributed to the death of the trees—the calcareous hard pan, lack of moisture, and food deficiency due to excessive evaporation.

42.1. *Air Currents*

42.1 : 32.7 : 31.42.12 : 31.43. BUCHANAN, T. S., and ENGLERTH, G. H. **Decay and other volume losses in windthrown timber on the Olympic Peninsula, Wash.** *Tech. Bull. U.S. Dep. Agric.* No. 733, 1940. pp. 29. [Bureau of Plant Industry, U.S.D.A.]

General observational data were taken on the condition of Douglas Fir, Sitka Spruce, Western Hemlock, Silver Fir, and Western Red Cedar trees during the four years following the blowdown on the Olympic Peninsula of Washington in 1921, and intensive detailed examinations of the material were made in 1926, 1929 and 1936. All data are presented

on both board- and cubic-foot bases. Four sources of loss in windthrown timber were recognized—breakage, high stumps, insect damage and decay. No loss from decay was noted until at least 2 years after the storm but after it once became evident the loss from this source soon exceeded that from any of the other three in all species except Western Red Cedar. The sapwood was first invaded by decay and the durability of the individual species was closely related to the percentage of sapwood present. The species in order of durability, beginning with the least durable, are Western Hemlock and Silver Fir, both rendered worthless by decay within 8 years after blowdown, Sitka Spruce, which showed little difference in rate of decay in sapwood and heartwood, all wood being destroyed within 15 years, Douglas Fir, the sapwood of which decayed rapidly but the heartwood decayed very slowly, and Western Red Cedar, the heartwood of which is not decayed after 15 years and indications are that it will remain sound for many years. *From authors' summary.*

42.1 : 42.21. WOELFLE, M. Bekämpfung von Sturm-, Wind- und Spätfrostschäden. [**Protection against storm, wind, and late frost damage.**] *Forstwiss. Cbl.* 63, 1941 (49–60). [G.]

This paper is a supplement to the author's booklet on silviculture in relation to forest meteorology [cf. *For. Abs.* 1 (206)]. A brief discussion is given of the principal protective measures, the application of which is economically practicable, against damage by storms, wind, and late frost. Whereas the requisite knowledge is now available for solving nearly all major problems connected with the protection of forests against damage by atmospheric agencies, this knowledge has not so far been applied in German forestry in a planned manner on a large scale. Yet the resulting benefits would be very great compared with the expenditure involved. It is suggested—in the first place for the Bavarian State forests—that a programme of protection against damage from storms, wind, late frost, and any other atmospheric agencies, together with the data on which the programme is based, should be laid down at each of the working-plan revisions that take place once in 20 years in every forest district. This should be done by a forest meteorologist in collaboration with the working-plan officer and the manager of the district in question. It is estimated that, under the prevailing conditions, one meteorologist employed full time on this type of work could cooperate in 6–8 working-plan revisions per annum, and that three meteorologists would suffice for the whole of Bavaria. These should be university-trained foresters who have undergone a 2- to 4-year course of specialized instruction in forest meteorology.

42.2. *Temperature Influences*

42.22 : 12.25. CRAIGHEAD, F. C. **An effect of drought on White Pine.** *J. For.* 39, 1941 (618–9). [Bureau of Entomology & Plant Quarantine, U.S.D.A.]

Markedly shorter needles and stunted terminal growth of White Pine in Pennsylvania in 1935 and 1936 appears to be due to the late spring drought of those years.

42.3. *Precipitations*

42.32 : 12.25 : 31.2. VOLKERT, E. Die mechanisch-technischen Holzeigenschaften vom Schneebruch betroffener und verschonter Fichten aus Hochlagen des Erzgebirges. [**The mechanical and technical properties of the wood in trees damaged by snowbreak and in undamaged trees of Norway Spruce from high altitudes in the Erzgebirge.**] *Thar. forstl. Jb.* 91, 1940 (386–425). [G.] R.M.I.

In undamaged trees of Norway Spruce the strength of the wood was found to increase from the centre of the stem towards the periphery. This increase was much less marked in trees that had suffered from snowbreak, and wood of the latter group was inferior in all properties studied, except crushing strength, to that of the undamaged trees.

42.5. *Chemical Influences: Nutrient Deficiencies*

42.5 : 12.26–8 : 21.32. WORLEY, C. L., LESSELBAUM, H. R., and MATTHEWS, T. M. **Deficiency symptoms for the major elements in seedlings of three broadleaved trees.** *J. Tenn. Acad. Sci.* 16, 1941 (239–47). [University of Georgia, Athens.] L.S.

Deficiency symptoms for the elements Ca, K, Mg, S, P, N, and Fe, and the effects of deficiency on general plant development, are reported from sand-culture experiments with seedlings of *Ulmus pumila*, *Ailanthus altissima*, and *Catalpa speciosa*.

42.5 : 12.26–8 : 21.32 : 24.4. WAHLBERG, H. E. **Iron chlorosis in tree windbreaks.** *Calif. Citrogr.* 26, 1941 (228). L.S.

Yellowing and defoliation of *Eucalyptus* trees in parts of southern California has been due in many cases, particularly where the subsoil is calcareous, to iron deficiency. The best treatment so far found has been to inject powdered iron citrate into $\frac{3}{8}$-in. holes drilled into the heart of the trunk, allowing one hole for each 2 in. of trunk diameter—e.g. a 12-in. trunk requires about 6 holes equally spaced in a spiral round the trunk. When filling the holes enough room should be left for corking, and the final seal may be made with some pruning compound. The treatment has given beneficial results within 2–4 months, and satisfactory recovery has often been observed for a period of 3 years. If necessary the treatment can be repeated at the end of the period.

43. FOREST FIRES

43.0 *Predisposing Factors and Causes*

43.0 : 11.33. SHANK, H. M. **Slope index determinations.** *Fire Control Notes* 5, 1941 (154–5). [Idaho National Forest.]

For areas where slope is an important factor in the spread of forest fires, the mapping of gradients may form a useful basis for correlating experience. The technique of mapping gradients is discussed.

43.0 : 22.1. MORRIS, W. G. **Fire weather on clear cut, partly cut, and virgin timber areas at Westfir, Oregon.** *Timberman* 42 (10), 1940–41 (20–8). [Pacific Northwest Forest & Range Exp. Sta.]

The relative fire danger that remains following partial cutting and clear cutting in the Douglas-Fir region is determined by a number of distinct factors. This study is concerned with one of these factors—the fire-weather conditions near ground level—on a single operation during the first summer following logging. These conditions were found to be more severe in the clear-cut area than in either the heavy or light partial cutting areas and more severe in the latter areas than in virgin timber.

43.01 : 11.12. VILLENEUVE, G. O. L'échelle des vents de Beaufort et ses vitesses équivalents. **[The Beaufort wind scale and equivalent velocities.]** *La Forêt Québecoise* 3 (8), 1941 (31–9). [F.]

43.01 : 11.12 (79.6). GISBORNE, H. T. **How the wind blows in the forest of northern Idaho.** Northern Rocky Mountain Forest and Range Experiment Station, Missoula, Montana. 1941. pp. 12 + 2.

Charts showing the minimum, average and maximum wind velocities in miles per hour for June, July and August by time of day and for different elevations in the forest from ground level to the top of the canopy are presented and discussed in relation to fire-hazard conditions and fire protection.

43.01 : 11.14.7 : 11.14.3. PRATT, R. W. **Relative humidity—dew point chart.** *Timberman* 42 (11), 1940–41 (30).

The relative humidity of the atmosphere and the corresponding dew-point temperature can be read from this chart for various wet- and dry-bulb temperatures at a barometric pressure of 29·00 in. of mercury. A supplementary chart makes possible the determination of correction factors for pressures other than 29·00 in.

43.1. *Protective Measures*

43.1 (73). GOWEN, G. M. **Progress in forest fire control.** *Sci. Mon., N.Y.* 52, 1941 (523–9). [U.S. Forest Service.] L.S.

A popular statement of the progress made by the U.S. Forest Service in this sphere, with brief notes on advances in technique and equipment. In spite of increasingly adverse fire weather, the average annual acreage burned per million acres protected has steadily declined in the national forests from 8,400 in 1910–14 to 1,480 in 1935–39. The losses, however, are still too great, e.g. the total burned area in 1940 was 318,000 acres, and at this annual rate, fire would destroy over 3 million acres in 10 years.

43.1 : 60.31.2 (79.7). PRICE, W. H., and GROGAN, W. W. **The Clemons Tree Farm.** *W. Cst. Lumberm.* 68 (7), 1941 (12–8, 69–70). [Weyerhaeuser Timber Co.]

Detailed, illustrated description of a plan for the complete fire protection of reproduction on a private reforestation project on an area of 130,000 acres in the region of Grays Harbor, Washington.

43.1 : 81. STRAUB, A. E. **Fire news broadcasts to forest officers—with public contact aspects.** *Fire Control Notes* 5, 1941 (138–9). [Bighorn National Forest.]

Since July, 1940, a commercial broadcasting

station at Sheridan, Wyoming, has included in its programme a daily fire-protection bulletin for forest officers. This bulletin is said to have created considerable interest among the general public.

43.1 : 81. REYNOLDS, H. A. **Use of patrol in prevention and suppression of forest fires.** *J. For.* 39, 1941 (752–6). [Massachusetts Forest & Park Association.]

Experiments in the use of forest fire patrols to supplement suppression measures in a number of townships in Massachusetts have usually resulted in a reduction both in fire losses and in the total cost of protection. Patrolmen are equipped with light trucks and fire-fighting equipment and may be engaged on hazard reduction or educational work when not actually patrolling. The benefits of such patrols are noted as (1) suppression of incipient fires, (2) prevention of fires, and (3) the educational and psychological effect they have upon the public.

43.1 : 81. MORRIS, W. G. **Should fire control planning procedures be standardized?** *J. For.* 39, 1941 (723–4). [Pacific Northwest Forest & Range Exp. Sta.]

It is maintained that the fire-control plan should not become too standardized but should be adaptable to improvements as they develop. Further explanations are given on points that were raised in a previous article and were later criticized. [Cf. *For. Abs.* 1 (293), 2 (242).]

43.1 : 81 (79.4). SHOW, S. B., ABELL, C. A., DEERING, R. L., and HANSON, P. D. **A planning basis for adequate fire control on the Southern California National Forests.** *Fire Control Notes* 5, 1941 (1–59). [Region 5, U.S. Forest Service.]

The fire-control problem in the Southern California National Forests is primarily one of ensuring favourable water-flow conditions for irrigation agriculture. This study is intended to establish a sound basis for fire-control planning and does not include the details of a specific plan. An analysis is made of over 3,000 fires occurring in the years 1922 to 1939, on which detailed individual reports had been obtained. The importance of such reports as a source of statistical material for the planning of fire-protection systems is well illustrated. The technique employed in analysing the large mass of data thus obtained is interesting and in many respects original, especially as regards the determination of speed of attack and size of crew required to keep the average annual burn to within 0·15 of 1 per cent. of the protected area—the recommended fire-control objective.

Six 'fire control zones' based on botanical types are recognized, of which two are of major importance. The latter include grassland, brush, and open woodland, found mainly at the lower elevations. Lightning fires are of minor importance. Most man-caused fires originate close to the roads—a condition that renders the use of tank trucks highly effective.

To attain the burned-area objective mentioned above it is recommended that, in the two major zones, initial attack be made with 3- to 5-man units equipped with tank trucks, an average elapsed time of 15 minutes being allowed between discovery and first attack. This presupposes a relatively large number of attack centres, with small but highly skilled and well trained, mechanized crews. Other recommendations include: increased fire-prevention effort; a reliable system of fire-hazard rating and forecasting, with advance plans and procedures to cope with given fire-danger conditions; a full road system to increase the scope of mechanized attack; and the increased use of backfiring from prepared firebreaks as an attacking measure on large fires, rather than as a last defence. H. W. B.

43.1 : 81 : 07.7. LATHROP, C. H. **Value and application of radio in fire protection.** *J. For.* 39, 1941 (760–2). [Connecticut Forest & Park Commission.]

43.1 : 90 : 81 (74). HOAR, C. A. **National policies governing fire control in New England.** *J. For.* 39, 1941 (763–7). [U.S. Forest Service.]

43.11 : 42.1 (74). AMOS, E. G. **Final report on the New England Forest Emergency Fire Hazard Reduction Project.** *J. For.* 39, 1941 (749–52). [U.S. Forest Service.]

With reference to fire hazard reduction following the hurricane of September, 1938.

43.12. BRUCE, H. D. **Theoretical analysis of smoke-column visibility.** *J. agric. Res.* 62, 1941 (161–78). [California Forest & Range Exp. Sta.]

A theoretical analysis is given of the visibility of a smoke column from a forest lookout. The visibility of the smoke is considered to be its contrast in brightness with the background. The contrast ratio is expressed in terms of the

light flux entering the observer's eye from the smoke, the haze, and the background and the flux in terms of the scattering and reflecting properties of the various elements. From this expression an equation is derived for the maximum distance a given smoke could be seen under specified conditions. The equations appertain to various types of illumination and to smokes seen against both sky and terrestial background. The theory indicates that the maximum distance at which a smoke is visible is inversely proportional to the amount of haze in the atmosphere, the proportionality factor being the logarithm of a complex quantity involving the sun's azimuth along with certain characteristics of background, the smoke, the illumination, and the vision. For the practical utilization of the derived equations there are suggested several procedures of increasing complexity leading to diminishing standard error in the estimation of maximum visibility distances. *From author's summary.*

43.12 : 38.2. SMITH, W. D. **Recent developments in lookout tower practice.** *J. For.* 39, 1941 (677–9). [U.S. Forest Service.]

Revised specifications of the lumber to be used in tower construction, with the object of eliminating compression wood and hence warp and crook from the timbers, and new specifications for creosote treatment have resulted in wooden towers that are generally acceptable under the wood-use policy of the U.S. Forest Service. Up to the present, erection costs for steel towers have been consistently lower than those for wooden towers.

43.12 : 38.2 : 82. WALLNER, O. Brandtornens anordnande ur arbetarskyddssynpunkt. [**The design of fire towers from the point of view of workers' safety.**] *Skogen* 28, 1941 (158–60). [Sw.] L.S.

Fire towers should be no higher than is required for adequate coverage of the area served. Steps and ladders should be inclined at a suitable angle and should have hand rails. Wooden ladders should be treated with a good preservative. Hand rails should also be provided at dangerous places such as balconies round the look-out room, ladder heads, etc. In wooden towers there should be means of escape in case of fire in the towers themselves, especially if living quarters are built in. Living quarters should be designed for protection against fire and fire extinguishers should be provided.

43.12 : 31. HALE, W. F. **Adoption of the grid system in forest fire detection.** *J. For.* 39, 1941 (777–8). [New Hampshire Forest & Recreation Department.]

Maps used in fire towers and fire wardens' offices are subdivided according to the master grid of the U.S. Geological Survey maps into quadrangles, blocks and sections for purposes of reference in reporting and locating fires.

43.13 : 07.7. **One-man portable fire pump developed by [B.C.] Forest Service.** *B. C. Lumberm.* 25 (9), 1941 (31).

The pack unit consists of a 1-h.p., 4-cycle, air-cooled, petrol-driven engine and pump, with 100 ft. of 1-in. hose, nozzle, suction hose and strainer, and a supply of petrol and oil sufficient to operate it for 4½ hours, giving a total weight of 60½ lb. At normal speed, water is delivered at a pressure of about 80 lb. but this can be increased to a maximum of 125 lb.

43.13 : 07.7. FUNKE, F. W. **Water—the fire extinguisher.** *Fire Control Notes* 5, 1941 (147–53). [Region 5, U.S. Forest Service.]

A cheap hose nozzle claimed to give an exceptionally large vapour volume has been designed for use in forest-fire control. An application for patent is pending, which, if granted, will dedicate the device to public use.

43.13 : 07.7. PERKINS, N. L. **A portable flame thrower.** *Fire Control Notes* 5, 1941 (144–6). [Los Padres National Forest.]

The mobile unit described by Funke [cf. *For. Abs.* 2 (243)] has been adapted for transport on mules, and a light asbestos-aluminium shield has been added to the equipment to protect operators from heat.

43.13 : 07.7. CHERRY, C. L. **Some aspects of use of heavy equipment in fire suppression.** *J. For.* 39, 1941 (756–60). [Massachusetts Department of Conservation.]

Description of a 95-h.p. brush-breaker fire truck and its equipment. This unit is designed to fight fires in the brush off the roadway, the working parts being protected by steel plates.

43.13 : 07.7. **Canadian Government Purchasing Standards Committee. Specification for linen hose, forestry type.** Codes and Specifications Section, National Research Council, Ottawa. *Tentative* No. 13–GP–1–1940. pp. 5.

43.13 : 81. ANDERSON, R. E., RASMUSSEN, B. L., and CHURCH, V. V. **Adapting advanced principles of organization and**

fireline construction to CCC suppression crews. *Fire Control Notes* 5, 1941 (123–8). [Siskiyou National Forest.]

Notes on the organization, training, and equipment of a 40-man crew of the type described by Cliff and Anderson [cf. *For. Abs.* 2 (158)]. Steps are being taken to organize one such crew in every CCC camp in Region 6, U.S. Forest Service.

43.13 : 81. GODDEN, F. W. **Over-all correlation of the suppression job.** *Fire Control Notes* 5, 1941 (131–4). [Salmon National Forest.]

Notes on the co-ordination of fire-suppression work during heavy fire periods within a National Forest. The organization described is that adopted in the Salmon National Forest, Region 4, U.S. Forest Service.

43.13 : 82 : 07.1. WALDO, H. C. **The technique of training suppression forces.** *J. For.* 39, 1941 (770–3). [U.S. Forest Service.]

43.13 : 82 : 07.1. ROCHESTER, D. M. **Forest fire suppression forces training techniques.** *J. For.* 39, 1941 (773–6). [U.S. Forest Service.]

43.13 : 82 : 81. HANSON, P. D., and ABELL, C. A. **Determining the desirable size of suppression crews for the national forests of northern California.** *Fire Control Notes* 5, 1941 (156–60). [Lassen National Forest.]

In order to estimate the desirable size of crews for initial attack, approximately 8,400 fires that had been successfully controlled in northern California during 1925–37 were grouped (1) in 7 classes according to rate of spread and (2) according to the size of the crews used in the initial attack. It was reasonable to assume that these crews were not too small, but that on the contrary they were probably overmanned to some extent. Accordingly, the data were modified using 1,030 representative suppression-crew reports, in each of which was stated the foreman's opinion as to the number of men in the initial attacking force that would have been sufficient to assure the eventual control of the fire in question. The information thus obtained is presented in a set of curves from which it appears that under the prevailing conditions a crew of about 5–6 men would be the most efficient unit for initial attack in areas of rapid rate of spread, since it could be expected to handle well over half the fires having an average rate of perimeter spread of 20 chains per hour, and that 3- to 4-man crews would suffice for initial attack in zones with a lower rate of spread. With these figures it is assumed that reinforcing crews are available within a reasonable time.

43.2. *Fire Insurance*

43.2 : 95.4 (73). SHEPARD, H. B. **Forest fire insurance—protection's ally.** *J. For.* 39, 1941 (768–70). [U.S. Forest Service.]

It is argued that a fairly wide application of forest fire insurance would have a strong influence in reducing forest fire losses.

43.3. *Fire Damage*

43.3 : 31.42.11 : 31.8 : 12.26–8. HEPTING, G. H. **Prediction of cull following fire in Appalachian Oaks.** *Repr.* from *J. agric. Res.* 62, 1941 (109–20). [Bureau of Plant Industry, U.S.D.A.]

Investigation of decay that developed from basal fire wounds on Oaks led to the development of an empirical equation by which the cull that follows a particular fire can be predicted. The equation is for single trees and is based upon the width of basal wounds 12 in. above ground and the number of years since the fire. Much of the variation in the amount of cull among trees with wounds of similar sizes and ages was due to the different fungi that became established. Of the 16 species of decay fungi isolated, the most common were *Stereum frustulosum* and *Hydnum erinaceum*. *From author's summary.*

44. DAMAGE BY HARMFUL PLANTS: VIRUS DISEASES

44.1. *Forest Weeds*

44.1 : 12.26–8 : 12.29 : 22.2. CENTRAL PROVINCES AND BERAR. **Administration report on the Forest Department in the Central Provinces & Berar for the year ending the 31st March, 1940.** Govt. Printing, Nagpur. 1941. pp. 38.

Bamboo regrowth may be a serious obstacle to Teak coppice in the moist type. This can be overcome by felling and burning the Bamboo a year or so before main fellings, cutting the regrowth with the tree crop, burning the felling debris, and removing all Bamboos interfering with Teak coppice for a year or two (p. 9). In forests where *Lantana* is an obstacle to Teak regeneration, the burning of the shrub for 3 years in succession prior to main fellings appears to improve conditions (p. 10).

44.2. *Parasitic Higher Plants*

44.2 : 12.26–8. De, R. N. ***Loranthus* pest and its control.** *Indian For.* 67, 1941 (348–51).

Lopping is so far the only practicable means of eradicating Loranthaceous parasites. It should be carried out after flowering but before the seeds ripen. As the parasite species often affect more than one host species, it is necessary to exterminate them not only from all trees in a plantation but also from the immediate vicinity. Control is cheap and effective if the parasites are dealt with as soon as they make their appearance. A list is appended of species of Loranthaceae and their host plants.

44.2 : 12.26–8 : 12.21. United States. **Report of the Chief of the Bureau of Plant Industry, 1940.** Supt. of Documents, Washington, D.C. 1940. pp. 56.

A fungus disease at present thought to be *Fusarium* sp. has been found to attack certain forms of dwarf mistletoe (*Arceuthobium* spp.) with great virulence and may prove valuable in the biological control of this tree parasite (p. 17).

44.3. *Fungi*

44.3 : 12.21 : 31.42.11. Mallonga, A. C. **Root rot of some Philippine forest trees caused by *Ganoderma lucidum* (Leys.) Karsten.** *Philipp. J. For.* 4, 1941 (1–13). [Bureau of Forestry, Philippines.]

In the Philippines *G. lucidum*, apart from its common occurrence on dead trees, stumps, etc., frequently infects living roots through wounds caused by various mechanical agencies and often kills the tree thus infected. The most favoured hosts are the Leguminosae. Control measures include the removal of dead, infected wood from susceptible stands and the avoidance of injuries through which infection may take place.

44.3 : 12.25 : 12.21. Christensen, C. M. **Observations on *Polyporus circinatus*.** *Phytopathology* 30, 1940 (957–63). [Minnesota Agricultural Exp. Sta.]

At Itasca Park, in north-western Minnesota, *P. circinatus* is reported as occurring commonly on *Picea glauca*, occasionally on *P. mariana*, *Pinus banksiana* and *Abies balsamea*, and once on *Pinus resinosa*. Some doubt is thrown upon statements that this fungus causes most damage by predisposing trees to windthrow, and cases are described in support of the view that seriously infected trees could not long survive even if they were not blown over. From dissections it appears that the fungus often attacks trees 15–25 years old or still younger. Decay apparently progresses rather slowly, but when it extends into or near the cambium of most of the larger roots and the butt, the tree ceases growth and eventually falls or is overturned. Though not sufficiently abundant to cause alarm, *P. circinatus* might become important under plantation conditions, and further research on the process of infection is desirable. Notes are included on the morphology of the fruiting bodies, on the microscopic characters of the decay, and on cultural characters of the fungus.

44.3 : 12.25 : 23.26 : 12.11.21. Fisher, P. L. **Germination reduction and radicle decay of conifers caused by certain fungi.** *Repr.* from *J. agric. Res.* 62, 1941 (87–95). [Bureau of Plant Industry, U.S.D.A.]

Records are presented of fungi and bacteria isolated from the interior of fresh and stratified seeds and seeds from nursery beds where germination had failed. Some of the cultures that were obtained from seed of various Pine species, and cultures derived from other sources, were used for laboratory inoculation experiments with seed of *Pinus banksiana*, *P. ponderosa*, and *P. resinosa*. These host species were not observed to differ significantly in their susceptibility to attack by the various fungi tested. *Botrytis* (*cinerea*?), *Fusarium* spp., *Pythium debaryanum*, *P. ultimum*, *Rhizoctonia*, *Sphaeropsis ellisii*, *Verticillium*, an unidentified phycomycete, and 4 other unidentified fungi caused decay of newly emerged radicles in all three Pine species. *Aspergillus niger*, *Cylindrocladium*, *Penicillium*, *Pestalozzia*, 'plaster mold', and 2 unidentified fungi did not cause consistent loss of radicles. No attack on radicles was noted for *Alternaria brassicae* var. *microspora*, *Chaetomium globosum*, *Mucor*, *Rhizopus* sp., *R. circinans*, *R. oryzae*, *Thielavia*, and one unidentified fungus. There was a general decrease in the germination percentage in practically all inoculated seed lots, even where no visible radicle or seed decay occurred. The temperatures employed were rather low, and the reduction in germination was greater than reported for tests conducted at room temperatures by another writer. [*J. agric. Res.* 42, 1931 (71–92).]

44.3 : 12.25 : 12.21. **Disease of Silver Fir in underplanting.** *Gdnrs.' Chron.*, Ser. 3, 109, 1941 (236). R.A.M. 20 (434).

Abies alba trees in Britain have recently been attacked by a disease caused by *Trichosphaeria parasitica* [*Acanthostigma parasiticum*]. It is suggested that attack is due to planting the trees under too intense shelter where the soil is moist. Diseased trees are very restricted in growth and young shoots wither and become bleached in appearance, though the terminal shoot generally remains unaffected. Young trees are found to recover satisfactorily, recovery being hastened by opening the canopy to admit light and air. Any kind of Silver Fir is liable to attack, and Hemlock is also known to be susceptible.

44.3 : 12.25 : 12.21. ZENTMYER, G. A. **Cytospora canker of Italian Cypress.** *Phytopathology* 31, 1941 (896–906). [Connecticut Agricultural Exp. Sta.]

A canker disease of *Cupressus sempervirens* var. *stricta*, caused by *Cytospora cenisia* forma *littoralis* f. nov., is described from central and northern California, occurring not more than 4 miles from the coastline. The horizontal form of *C. sempervirens*, and to a limited extent *C. glabra*, have also been attacked, and the fungus has been found on *C. macrocarpa* as a saprophyte or weak parasite. Many trees of *C. sempervirens* var. *stricta* have been killed and others ruined for ornamental purposes. In culture, the fungus will not grow above 20° C., the optimum being near 19° C.

44.3 : 12.25 : 12.21. STRONG, F. C., and CATION, D. **Control of Cedar rust with sodium dinitrocresylate.** *Phytopathology* 30, 1940 (983). [Michigan State College, East Lansing.]

Single sprayings with sodium dinitrocresylate (Elgetol), applied on 8th May to one group of host plants on on 16th May to another, inhibited telial column extension and teliospore germination from rust galls of *Gymnosporangium globosum* and *G. juniperi-virginianae* on *Juniperus virginiana*, and of *G. clavipes* and *G. clavariaeforme* on *J. communis*. A 1-per-cent. solution of 'Elgetol regular' was the most effective. Exceptionally thorough spraying was necessary for positive results. No foliage injury was later apparent on *J. virginiana* and only a trace of injury on some of the badly infected *J. communis*.

44.3 : 12.25 : 12.21 : 13.2 : 31.42.12. RUMBOLD, C. T. **A blue stain fungus, *Ceratostomella montium*, n. sp., and some yeasts associated with two species of *Dendroctonus*.** *J. agric. Res.* 62, 1941 (589–601). [Bureau of Plant Industry, U.S.D.A.] O.R.E.

The bark beetles *Dendroctonus monticolae* and *D. ponderosae*, which infest various species of Pine on the mountains of the Pacific Coast and adjacent regions, are also vectors of a blue-stain fungus, *Ceratostomella montium* sp. nov. This fungus has so far been recorded from sapwood of *Pinus contorta* var. *latifolia*, *P. flexilis*, *P. monticola*, and *P. ponderosa* in the central Rocky Mountain region, and may possibly occur in other parts of the natural range of the beetles. In culture, the fungus did not tolerate high temperatures but grew well at 12–22° C. and best at 16° C.; thus it is unlikely to spread from the mountain forests to other regions. The beetles were also found to carry two types of yeast fungi—an anascosporous mycelium-forming group and *Zygosaccharomyces pini*.

44.3 : 12.25 : 12.21 : 45.3 : 13.2 : 12.11.12. BRAMBLE, W. C., and HOLST, E. C. **Fungi associated with *Dendroctonus frontalis* in killing Shortleaf Pines and their effect on conduction.** *Phytopathology* 30, 1940 (881–99). [Bureau of Plant Industry, U.S.D.A.]

Infestation of living Shortleaf Pine by *D. frontalis* was followed by a complex invasion of the sapwood accomplished within a short period by a number of fungus species. Certain of these, though few in number, were constantly present in infested trees, where they played an active part in aiding the beetles to bring about death. Such primary invading fungi penetrated the sapwood in advance of secondary invaders and took about two weeks to reach the heartwood of trees 4–6 in. d.b.h. As the sapwood became infected, water conduction to the crown ceased, indicating some blockage of the transpiration stream. *Ceratostomella pini* was not the chief invader immediately after infestation, but was accompanied and even preceded in early stages by other fungi, among which *Dacryomyces* sp. and *Zygosaccharomyces pini* were prominent. Later, however, *C. pini* penetrated rapidly into the inner growth rings and appeared to take the lead in further infection of the sapwood. The results of inoculations showed that of the three species mentioned, only *C. pini* was able of its own accord to penetrate into the heartwood of inoculated healthy stems. Interference with conduction occurred during initial penetration, before the foliage changed colour; in view of this the secondary invaders that appeared only

at late stages are not considered important in connexion with death of the trees, and inoculations with some of them suggest that they merely accompany or follow the primary invaders. None of the fungi did more than assist in killing the trees; even *C. pini*, the most active, has been shown to require wounds of considerable peripheral extent before it can seriously damage a healthy stem. Wounded areas of sufficient extent are provided in nature by the numerous tunnels of the bark beetles, and the association of beetles and fungi may possibly be advantageous to both types of organism. It is not yet known exactly how the fungi interfere with water conduction in the stem; preliminary experiments indicate, however, that *C. pini* can cause blockage of water-conducting channels in the sapwood by internal wounding, which gives rise to resin formation and the sealing with resin of the pits between tracheids.

44.3 : 12.25 : 12.21 : 45.3 : 13.2. CRAIGHEAD, F. C., and ST. GEORGE, R. A. **Field observations on the dying of Pines infected with the blue-stain fungus, *Ceratostomella pini* Münch.** *Phytopathology* 30, 1940 (976–9). [Bureau of Entomology & Plant Quarantine, U.S.D.A.]

In the summer and autumn of 1933, towards the end of an outbreak of *Dendroctonus frontalis* in Virginia, many Shortleaf Pines were attacked by the beetles, but owing to a plentiful resin flow most of the latter were killed before they could construct egg tunnels, and those reaching the xylem were few in comparison with the number in successfully attacked trees. The foliage of these unsuccessfully attacked trees did not fade until the following spring, as the extent of blue stain that developed from the smaller number of beetle contacts was insufficient to cut off conduction rapidly. Examination of some of the trees in May, 1934, showed that the blue stain coincided with the attacked portions of the stems, although scarcely any beetle broods had developed in them. These observations fully support results obtained by Bramble and Holst [cf. preceding abstract].

44.3 : 12.25 : 12.21. BENTON, V. L., and EHRLICH, J. **Variation in culture of several isolates of *Armillaria mellea* from Western White Pine.** *Phytopathology* 31, 1941 (803–11). [University of Idaho, Moscow.]

The results of experiments on a number of *Armillaria mellea* isolates from roots of mature *Pinus monticola* gave evidence of wide variation in cultural characteristics in certain cases. Characteristics studied were appearance in culture and rhizomorph production, diameter of mycelial growth, degree of saprogenicity, and response to differences in wood moisture content, temperature, and pH. The following optimal values were determined:—Approximately 150 per cent. or slightly higher initial wood moisture content (initial oven-dry basis); 21° to 25° C. for growth on malt agar at pH 5·0; and pH 4·5 and pH 5·5 for growth on malt agar at 25° C.

44.3 : 12.25 : 12.21. RIKER, A. J., and KOUBA, T. F. **Developing resistance to blister rust.** *Wis. Conserv. Bull.* 5 (10), 1940 (35–7).

Seedlings and grafted stock have been developed from White Pine trees that appear to be resistant to blister rust (*Cronartium ribicola*).

44.3 : 12.25 : 12.21. UNITED STATES. **Report of the Chief of the Bureau of Plant Industry, 1940.** Supt. of Documents, Washington, D.C. 1940. pp. 56.

Whitebark Pine (*Pinus albicaulis*) is highly susceptible to White Pine blister rust and can be infected from *Ribes* at distances greater than those over which the disease can usually spread to other Pine species (p. 17).

44.3 : 12.25 : 12.21 : 12.26–8. SNELL, W. H. **Blister rust studies of three patches of red currants in New York.** *Phytopathology* 31, 1941 (732–40). [Conservation Department, Albany, New York.]

In relation to White Pine blister rust, the most important aspect of any species of *Ribes* is its susceptibility to the fungus and the consequent potential volume of sporidial inoculum. Compared with other species, the relatively resistant red currants are more affected by various factors that limit the production of this inoculum. The results of studies of 3 patches of currants are used to illustrate certain of these factors. It is shown that only 1 or 2 bushes in a row of 6 or 12 are more than slightly, if at all, infected; that infected red-currant leaves are dropped very early in the summer; that red-currant bushes are defoliated much earlier than black currants or wild gooseberries, and the earlier, the more infected they are. In 2 lots of currants growing on abandoned farms 75–96 per cent. of the infection spots were necrotic before the end of July, 1940, before telia and,

sometimes, even uredia, could be produced. On 1 bush telia were observed at the rate of 41 per sq. in., instead of 2,400 per sq. in. under optimum conditions. Furthermore, on these bushes 95 per cent. of the telia were only 22–50 per cent. as long as those considered normal for red currant, and most of these were apparently dead. On bushes of the same 2 patches, the earlier-formed, dead infection spots were 0·0112 sq. in. in area, while the fresh, live spots averaged about 0·0036 sq. in., some being so small that they bore only a single uredium. *From author's summary.*

44.3 : 12.26–8 : 23.26.4. WRIGHT, E. **Control of damping-off of broadleaf seedlings.** *Phytopathology* 31, 1941 (857–8). [Bureau of Plant Industry, U.S.D.A.]

A study has been made in Federal nurseries of the Great Plains region of the effects of rotation and previous crops on damping-off of hardwood seedlings. The most frequently identified damping-off fungi were *Rhizoctonia solani* and *Pythium ultimum.* In both field and greenhouse tests, damping-off was usually more severe after legumes than after cereals. Corn, wheat and oats were followed by the least damping-off. Analyses for soluble N in the form of nitrate N showed that the trend of damping-off increased directly with the nitrate content of the soil. Means of counteracting this effect by adding various materials to the soil were also tested. Application of glucose to the seedbed at time of sowing gave the greatest reduction in damping-off, preliminary field tests with *Ulmus americana* in a sandy loam soil showing a final stand of 293 per cent. on glucose-treated as compared with check plots. The seedlings grown on the glucose-treated plots were, however, somewhat stunted at the end of the first growing season. Similar treatments of silt-loam soil were less successful. Fuller results are to be published later.

44.3 : 12.26–8 : 12.21. HIRANE, S. **Studies on the parasitism of the rust of *Acacia confusa* Merrill, *Maravalia hyalospora* (Saw.) Diet. III. A cytological study of different regions of phyllodes with varying degrees of resistance to urediospore infection.** *Ann. phytopath. Soc. Japan* 10, 1940 (171–85). [Jap.e.] R.A.M. 20 (284).

Cf. *For. Abs.* 1 (141, 241).

44.3 : 12.26–8 : 12.21. LIHNELL, D. *Schizophyllum commune* som trädparasit i vårt land. [***Schizophyllum commune* as a tree parasite in our country.**] *Växtskyddsnotiser, Växtskyddsanst., Stockh.* 1941 (1), (11–2). [Sw.] R.A.M. 20 (433).

This fungus has recently been found on fruit trees and Ash in Sweden, where it was previously little known and had been observed only as a saprophyte on winter-killed wood.

44.3 : 12.26–8 : 12.21. SUMSTINE, D. R. **Notes on some new or interesting fungi.** *Mycologia* 33, 1941 (17–22). R.A.M. 20 (283).

An account is included of *Microsphaera platani* Howe, which attacks both the young and the older leaves of Plane and has become a menace to shade trees at Overbrook, Philadelphia.

44.3 : 12.26–8 : 12.21. MILLER, P. A. ***Phytophthora* bleeding canker of *Quercus agrifolia*.** *Abstr.* of paper presented at the 1941 annual meeting of the Pacific Division of the American Phytopathological Society, in *Phytopathology* 31, 1941 (863).

Bleeding canker of *Quercus agrifolia* was first observed in California in the Los Angeles area in the spring of 1938, and has since been found in the Pasadena, San Marino and Santa Barbara areas. Active cankers appear as oozing bark fissures at the root crown and upwards at intervals on the trunk. Behind such fissures lie fluid-filled, interconnected cavities in the inner bark, cambium, and sapwood. Artificial inoculations of *Q. agrifolia* and *Q. virginiana* with a species of *Phytophthora* isolated from infected sapwood produced characteristic lesions. Bark tracing is ineffectual as a means of control.

44.3 : 12.26–8 : 12.21 : 31.1. METCALFE, G. **The watermark disease of Willows. II. Pathological changes in the wood.** *New Phytol.* 40, 1941 (97–107). R.A.M. 20 (431–2).

The presence of *Bacterium salicis* and associated bacteria [*For. Abs.* 3 (78)] induces two important changes in the wood, namely 'oily degeneration' of the protoplasm of certain ray cells, resulting in their death, and the appearance of tyloses in the vessels. These changes are described and discussed in detail.

44.3 : 12.26–8 : 12.21. TEHON, L. R., and HARRIS, H. A. **A Chytrid inhabiting xylem in the Moline Elm.** *Mycologia* 33, 1941 (118–29). R.A.M. 20 (283–4).

A Chytrid was discovered in 1932 on a diseased Moline Elm at Madison, Wisconsin, and was described as *Carpenterella molinea* gen. et sp. nov. All attempts to isolate the organism

in culture failed, but spherical bodies found in discoloured sections of the wood are believed to be oospores, and primitive thalli were observed in the xylem cells. Cultural trials and microscopic examination failed to show the presence of any other organism in the diseased tree, but there is no conclusive evidence that the Chytrid was the cause of the disease. Its presence, however, suggests that Chytridaceous organisms can invade tissues in the trunk and branches of woody plants and might possibly assume the rôles of parasites or commensals.

44.3 : 12.26–8 : 12.21. REX, E. G. **Dutch Elm disease eradication in 1940.** *Shade Tree* 14 (1), 1941 (1–7). [New Jersey State Department of Agriculture.]

A brief review, accompanied by tables showing the major work area by States; diseased trees found in the United States in each of the years 1930–40; New Jersey suspect collections and laboratory identifications; diseased trees found in New Jersey for each of the years 1933–40; and Federal appropriations and State co-operative contributions from 1931 to 20th Jan., 1941. The total number of diseased trees found in 1940 was 4,445, as compared with 10,786 in 1939.

44.3 : 12.26–8 : 12.21. BANFIELD, W. M. **Distribution by the sap stream of spores of three fungi that induce vascular wilt diseases of Elm.** *J. agric. Res.* 62, 1941 (637–81). [Bureau of Plant Industry, U.S.D.A.] O.R.E.

Results are presented and discussed of experimental injections and inoculations of species of *Ulmus* with spores of *Ceratostomella ulmi*, *Verticillium dahliae*, and *Dothiorella ulmi*. Details are given of the rate and extent of spore distribution as affected by the season, method, and point of introduction into the trees. It is concluded that rapid invasion of the bole and crown during the leafy season is due to the transportation of the spores by the sap stream in the large vessels of the new annual ring.

44.3 : 12.26–8 : 12.21. SMUCKER, S. J. **Comparison of susceptibility of the American Elm and several exotic Elms to *Ceratostomella ulmi*.** *Phytopathology* 31, 1941 (758–9). [Bureau of Plant Industry, U.S.D.A.]

A series of inoculations was made in early June, 1940, on several species and varieties of Elm. The trees ranged from ⅜ to 1¼ in. in diameter at base, and all except the Christine Buisman Elms were seedlings. The 'Mormon Elm' appeared to be a form of one of the small-leaved European species. The chief results observed up to the end of the growing season are presented in the accompanying table.

Comparison of infection and dieback of Elms inoculated with Ceratostomella ulmi *in* 1940.

Species	*Number of trees inoculated*	*Percentage developing symptoms*	*Mean percentage of main leader dieback (end of growing season)*
U. americana	100	100	90·89 ± 2·6810
U. laevis	88	100	81·09 ± 1·8452
U. foliacea	11	100	69·98 ± 8·8619
U. procera	28	100	53·02 ± 5·4720
U. japonica	10	100	23·73 ± 11·8960
'Mormon Elm'	10	100	19·20 ± 1·3500
U. pumila	218	42	10·69 ± 0·8835
„ „ var. *pinnato-ramosa*	10	70	4·79 ± 0·9833
„ „ var. *arborea*	10	30	2·09 ± 0·7830
U. foliacea var. Christine Buisman	7	86	0·0

44.3 : 12.26–8 : 12.21 : 13.2. FELT, E. P. **European Elm bark beetle and Dutch Elm disease.** *J. econ. Ent.* 33, 1940 (556–8). R.A.E. A29 (212).

With particular reference to the disease in New Jersey and to *Scolytus multistriatus* as the principal vector of the causal fungus. Recently published figures indicate an inevitable spread of the disease, and it is likely that many infected trees have not been located and will not be found in the near future. Furthermore, the present policy of attempting to eradicate *S. multistriatus* will probably prove too expensive. In view of the facts that the beetle is chiefly a local insect and is rarely found except in diseased or dying wood, and that its normal limit of flight makes serious invasion from neighbouring tracts unlikely, it is suggested that local control might be effected at a low cost by two or three summer prunings and the

immediate burning of weak wood. It is also pointed out that the prompt removal of breeding material in most of the affected area is more important for local protection of trees than a knowledge of the exact cause of the sickly or dying condition, and that there seems to be little advantage in the costly procedure of searching out and destroying occasional diseased trees in remote woodland, since these cause little danger to valuable Elms in towns.

44.3 : 12.29 : 12.21. CENTRAL PROVINCES AND BERAR. **Administration report on the Forest Department in the Central Provinces & Berar for the year ending the 31st March 1940.** Govt. Printing, Nagpur. 1941. pp. 38.

An unidentified parasitic fungus is reported to cause Bamboo culms to develop a thick growth of leaves, and later to dry out and die. It is recommended that all affected culms be burnt (p. 8).

45. DAMAGE BY ANIMALS

45.1. *Mammals*

45.12 : 13.2 : 24. CURTIS, J. D. **The silvicultural significance of the porcupine.** *J. For.* 39, 1941 (583–94). [University of Maine.]

A study was undertaken over a period of two years in a five-acre forest tract in Massachusetts to determine the effect of porcupine (*Erethizon* sp.) feeding on a young hardwood stand, with particular reference to its silvicultural management. The tract was in close proximity to a number of porcupine dens. Records of porcupine feeding were separated into two groups—beneficial (i.e. useful weeding and pruning) and destructive, the latter greatly exceeding the former. It was found that: (*a*) Of the 23 species of hardwood trees and shrubs and 5 of conifers in the stand, 18 of the former and 1 of the latter were attacked; (*b*) the percentage of gnawed stems on all species decreased with distance from dens, although this did not hold for each individual species; (*c*) Hemlock, Sugar Maple, Basswood, Black Birch, Paper Birch and Striped Maple were the species most frequently used for food, in order of decreasing frequency, and of the more important species, White Ash, Black Cherry and Red Oak were the least used; (*d*) the kind of feeding and hence the type of damage varied with tree species; (*e*) the part of the tree eaten varied with season; and (*f*) trees apparently do not become less susceptible to attack with increasing age. Suggestions are made for possible control measures and adjustments in the silvicultural management of attacked stands. [Cf. *For. Abs.* 3 (164).]

45.12 : 45.2 : 23.1 : 12.19.2 : 12.25. MOORE, A. W. **Wild animal damage to seed and seedlings on cut-over Douglas Fir lands of Oregon and Washington.** *Tech. Bull. U.S. Dep. Agric.* No. 706, 1940. pp. 28. [Bureau of Biological Survey.]

Certain mammals and birds consume large quantities of forest-tree seeds in this region. White-footed mice are the most important consumers as they occur over the whole area. The shrew and related forms, in great abundance in the coastal strip, account for large quantities of seed, while squirrels, chipmunks and other mammals are of minor importance in total seed consumption. Reproduction is damaged and killed by browsing animals. The brush and snowshoe rabbits, common in the region, do the greatest amount of cropping, while the mountain beaver and apparently the big-game animals are of less importance. Artificial reforestation appears to suffer more from animal attack than does natural regeneration. *From author's summary.*

45.3. *Insects*

45.3. SCHWERDTFEGER, F. Forstlich bedeutsame Vorträge des 7. Internationalen Kongresses für Entomologie. Kritisches Sammelreferat. [**Papers of forestry importance read at the 7th International Congress of Entomology. Critical collective review.**] *Forstarchiv* 17, 1941 (267–78). [G.]

45.3 (71). GRAHAM, S. A. **Some practical aspects of forest entomology.** *23rd Annual Meeting Proceedings, Woodlands Section, Canadian Pulp & Paper Association* No. 616 (H–2), 1941 (10–2). [University of Michigan.]

The steps that can be taken by timberland operators to reduce the forest insect hazard are outlined, based largely on the known differences in the susceptibility of various forest types to insect injury.

45.3 (729.5). DELEON, D. **Some observations on forest entomology in Puerto Rico.** *Carib. For.* 2, 1941 (160–3). [E.e.span.] [Bureau of Entomology & Plant Quarantine, U.S.D.A.]

The shoot borer *Hypsipyla grandella* does

sufficient damage to affect *Cedrela mexicana* plantations seriously. Termites do the greatest amount of damage to forest produce, especially that imported from the United States.

45.3 (73). PIERSON, H. B. **Wanted—a new concept of forest protection.** *Amer. Forests* 47, 1941 (413–5, 446).

Suggestions are made for a new plan of forest protection, national in scope, to deal adequately with forest insects and diseases as well as fire protection.

45.3 : 12.25 : 13.2. KÔNO, H. Die Nitiduliden und Cucujiden in Tannen- und Fichtenwald in Japan. **[The Nitidulidae and Cucujidae of Fir and Spruce forest in Japan.]** *Insecta matsum.* 14, 1940 (56–62). [G.jap.] I.I.E.

Records are presented for 10 species of Nitidulidae and 9 species of Cucujidae collected on *Abies sachalinensis* and *Picea jezoensis* in Japan. *Stelidota hattorii* and *Europs todo* spp. nov. are described, the former taken from under the bark of a fallen stem of *A. sachalinensis* and the latter from under the bark of a stump of the same species. *Silvanus* (*Silvanoprus*) *fagi* Guér, a new record for Japan, has been found on standing *P. jezoensis* trees in Hokkaido.

45.3 : 12.25 : 13.2 : 13.15. HASEMAN, L., and MCLANE, S. R. **The history and biology of the Juniper midge (*Contarinia juniperina* Felt).** *Ann. ent. Soc. Amer.* 33, 1940 (612–4). R.A.E. A29 (432–3).

Dead tip growth on *Juniperus virginiana* caused by *Contarinia juniperina* Felt was first observed in Missouri in the late autumn of 1936 and became more severe in 1937 and 1938. The midge has one generation a year and overwinters in the larval stage in the top 3 in. of litter and soil under the trees. Pupation occurs in spring and the emergence of adults begins at the end of April. Mating, oviposition, and death usually occur within a few days of emergence. Eggs are laid under the base of the needles of new growth near the tip of the twigs and hatch in about a week. The larvae bore under the base of the needles and make a cavity in the soft twig; they do not become fully fed until October or November, when they drop to the ground, though a few mature live larvae occur in the twigs throughout the winter and even in spring. The injury appears in early summer as a watery blister, but by late summer or early autumn many of the twigs are cut and the tips begin to dry and bleach. A severely infested tree turns brown during late autumn, especially on the south exposure, and most of the brown tips break off during the winter. After 2 or 3 years of severe injury most of the fine growth is removed from the trees. *C. juniperina* appears to be confined to Junipers. In Missouri it attacks *J. virginiana* and *J. scopulorum* the most severely and other species to a less extent, but has not been found on the upright or Pfitzer varieties of *J. chinensis.* It is widely distributed in Missouri, has also been observed in Kansas, Nebraska and Kentucky, and probably occurs in other States. It appears to be unaffected by normal winter cold or prolonged high summer temperatures, but infestation is reduced by prolonged cold rains when the adults are emerging and ovipositing. The only effective natural enemy is *Platygaster pini* Fonts, which parasitizes the larvae and destroyed large numbers in 1938 and 1939.

45.3 : 12.25 : 13.2. SAWAMOTO, T. Ueber die Lärchenborkenkäfer von Sachalin, Hokkaido und Honshû. **[On the Larch bark beetles of Sakhalin, Hokkaido and Honshu.]** *Insecta matsum.* 14, 1940 (95–107). [G.] I.I.E.

Keys are provided for the identification of the 8 species of bark beetles known to occur in Sakhalin, Hokkaido, and Honshu on *Larix gmelini* [*L. dahurica?*] and *L. leptolepis* [*L. kaempferi*]. One new species, *Dryocoetes karamatsu,* is described from felled stems of *L. leptolepis* in Honshu, and *D. baicalicus* Reitter and *Pityogenes bidentatus* (Herbst.) are recorded for the first time in this geographical region.

45.3 : 12.25 : 13.2 : 13.15. WATANABE, C. **On two species of *Aphidius* bred from *Cinara laricicola* (Matsumura).** *Insecta matsum.* 15, 1940 (53–6). [E.] I.I.E.

Coelonotus (*Aphidius*) *pini* Hal. and *C.* (*A.*) *laricis* Hal., both new for Japan, were bred from *Cinara laricicola* Mats. on *Larix kaempferi* in Hokkaido in 1937–40. The adults of both sexes of these parasites are described, a key to them is given, and brief notes from the literature on their aphid hosts are included.

45.3 : 12.25 : 13.2. GOBEIL, A. R. ***Dendroctonus piceaperda* Hopk.: a detrimental or beneficial insect?** *J. For.* 39, 1941 (632–40). [Entomological Service, Department of Lands and Forests, Quebec.]

Losses following an outbreak of *D. piceaperda* in the Gaspé Peninsula in 1930–34 are analysed. While large quantities of timber have been

killed by this insect and imposing financial losses can be estimated as the result of such damage, it is pointed out that (1) severe damage is usually confined to overmature stands, and (2) evidence is against there being a shortage of Spruce either in Quebec Province as a whole or in the Gaspé Peninsula. Thus it appears that the insect accounts for a surplus of overmature timber that in any case would soon have to make way for younger growth.

45.3 : 12.25 : 13.2. DAVIAULT, L. La mouche à scie européenne de l'épinette dans les forêts du Nord du St. Laurent. [**The European Spruce sawfly in the forests north of the St. Lawrence.**] *La Forêt Québecoise* 3 (7), 1941 (12–6). [F.] [Laboratoire d'Entomologie forestière, Berthierville, Québec.]

So far little damage has been caused in these forests.

45.3 : 12.25 : 13.2. RUCKES, H. **Note on the feeding habits of *Brochymena carolinensis* (West.) in Florida.** *Bull. Brooklyn ent. Soc.* 36, 1941 (27–8). [College of the City of New York.] I.I.E.

This Pentatomid was observed at Fairvilla, Florida, feeding on the trunks of *Pinus palustris* and *P. caribaea*. The smooth, thin bark at the bottom of the deeper crevices is selected for feeding, as the beak of the insect is too slender to pierce the thicker portions. The insects fed only during the morning and occasionally at dusk, mostly on trees 8–10 in. in diameter and always on the shady side of the trunk. The resting periods are probably spent in the crown.

45.3 : 12.25 : 13.2 : 13.15. MATHERS, W. G., and OLDS, H. F. **The European Pine shoot moth in British Columbia.** *J. econ. Ent.* 33, 1940 (941). R.A.E. A29 (415).

Rhyacionia buoliana Schiff. reappeared in British Columbia in the city of Vancouver during 1938, and a preliminary survey indicated that the infestation had been in progress for at least 3 years. Further surveys in spring, 1939, showed that *Pinus contorta* and *P. mugo* were infested. Almost all the affected trees were removed and burnt, but a few valuable ones were clipped, and these, together with all the remaining Pines in the infested area, were sprayed on 11th July with a mixture of 18 lb. lead arsenate, 5 lb. nicotine sulphate and 2½ lb. emulsified herring oil in 240 gal. water. A further survey in spring, 1940, indicated that the infestation had been eradicated. Material bred in cages showed over 20 per cent. parasitism, the parasites recovered being 22 examples of *Ephialtes* (*Calliephialtes*) *comstocki* Cress., 4 of *Pimpla* (*Ephialtes*) *obesa* Cushm., 4 of *P.* (*E.*) *conquisitor* Say, and 1 of *P.* (*E.*) *evetriae* Vier.

45.3 : 12.25 : 13.2. SAWAMOTO, T. Ueber die Schwarzkiefernborkenkaefer in Hokkaido. [**On the bark beetles of Black Pine** (*Pinus nigra*) **in Hokkaido.**] *Insecta matsum.* 14, 1940 (141–8). [G.] I.I.E.

Keys, descriptions, and localities are given for the 4 species of bark beetles that occur on *Pinus nigra* in Hokkaido. These are *Blastophagus piniperda*, *Cryphalus jeholensis*, *Dryocoetes rugicollis*, and *Orthotomicus golovjankoi*.

45.3 : 12.25 : 13.2. KÔNO, H., and SAWAMOTO, T. ***Evetria washiyai* sp. nov.** *Insecta matsum.* 14, 1940 (149–51). [G.] I.I.E.

E. [*Rhyacionia*] *washiyai* sp. nov. is described from shoot tips and buds of *Pinus nigra* in Hokkaido.

45.3 : 12.25 : 13.2 : 22.83 : 24.2. EATON, C. B. **Influence of the mountain Pine beetle on the composition of mixed pole stands of Ponderosa Pine and White Fir.** *J. For.* 39, 1941 (710–3). [Bureau of Entomology & Plant Quarantine, U.S.D.A.]

In northeastern California the mountain Pine beetle (*Dendroctonus monticolae*) is attacking stands of Ponderosa Pine and White Fir (*Abies concolor*)—a type commonly found on old burns and cut-over areas. In some areas the injury has been severe enough to change the ratio of the two species from approximately 50:50 to nearly 100 per cent. Fir. Excessive competition in these stands together with low precipitation over a long period have resulted in reduced growth rate, particularly in the Pine. A slow growth rate in young Ponderosa Pine is believed to indicate low vigour, which appears to be associated with susceptibility to attack by the beetle. A brief description is given of an experiment in thinning Pine/Fir stands in favour of the Pine in order to produce more vigorous trees capable of resisting insect attack. *From author's summary.*

45.3 : 12.25 : 13.2 : 13.15. HETRICK, L. A. **Some factors in natural control of the Southern Pine beetle, *Dendroctonus frontalis* Zimm.** *J. econ. Ent.* 33, 1940 (554–6). R.A.E. A29 (211–2).

Examinations of Pine bark infested by *D.*

frontalis in Virginia during 1938–39 showed that many of the larvae were dead and infested with nematodes, while some appeared to be attacked by a pathogenic fungus. In 1939 mortality of the beetles in the bark from natural causes other than insect parasites was 51·3, 2·6 and 8·3 per cent. for the larvae, pupae and adults of the overwintering generation, and 35·1, 5·7 and 0 per cent. for those of the first generation. Nematodes were obtained from 79 and 37 per cent., respectively, of dead and living individuals of the overwintering generation in the field, from 60 per cent. of adults of this generation that emerged from bark placed in the insectary, and from 68, 27 and 49 per cent., respectively, of the corresponding insects of the first generation. Adequate rainfall during the winter of 1938–39 may have favoured a high degree of nematode parasitism. Mites were found on the bodies of 17 and 62 per cent. of the adults of the overwintering and first generations that emerged in the insectary. The percentage of insect parasitism for all stages of the beetle was 0·39 for the overwintering and 10 for the first generation. Nematodes may have been one of the factors responsible for the decline in infestation by *D. frontalis* that occurred in 1939; other factors were the nearly normal rainfall, which improved the vitality of the trees, the abundance of bird and insect predators, and periods of mild weather in winter, which caused the emergence of many adults that were apparently unable to attack the trees at that season.

45.3 : 12.25 : 13.2 : 23.26. MORTIMER, M. F. **The life history and control of the Pine tip moth, *Rhyacionia frustrana* (Comstock) (family Tortricidae) at Nashville, Tennessee.** *J. Tenn. Acad. Sci.* 16, 1941 (189–206). L.S.

Notes are given on the life history of this moth and on experiments with sprays to control it on Loblolly Pine in a Tennessee nursery. The most effective of 8 sprays tested was 2¼ pints fish oil, 26 oz. lead arsenate, and 3 lb. laundry soap, in 50 gal. water. This gave 87·4 per cent. control in the first and 91·8 per cent. control in the second generation. A stronger emulsion gave even better control but damaged the foliage too badly for practical use.

45.3 : 12.26–8 : 13.2 : 13.15. MARSH, F. L. **A few life-history details of *Samia cecropia* within the southwestern limits of Chicago.** *Ecology* 22, 1941 (331–7). [Union College, Lincoln, Nebraska.]

Of 23 food plants recorded for this Saturniid moth the 4 most preferred are *Salix nigra*, *Acer negundo*, *A. saccharinum*, and *Prunus serotina*. Some details are given of adult emergence, breeding behaviour, oviposition, the larval period, cocoon spinning, and pupation.

45.3 : 12.26–8 : 34.25 : 34.27. GOOT, P. VAN DER. **Some insect enemies of *Pithecolobium* and *Parkia*.** *Landbouw, Buitenzorg* 16, 1940 (503–15). [Du.e.] E.S.R. 85 (86).

The more important pests that damage seeds of Djengkol (*Pithecolobium lobatum*) and Peteh (*Parkia speciosa*), which are used as food by the natives of West Java, are the Djengkol weevil (*Tryphetus incarnatus* Gyll.), the Djengkol pod borer (*Argyroploce illepida* Bull.), and the Peteh pod borer (*Mussidia pectinicornella* Hamps.).

45.3 : 12.26–8 : 13.2. NOBLE, N. S. ***Trichilogaster acaciae-longifoliae* (Froggatt) (Hymenopt., Chalcidoidea), a wasp causing galling of the flower-buds of *Acacia longifolia* Willd., *A. floribunda* Sieber and *A. sophorae* R. Br.** *Trans. R. ent. Soc. Lond.* 90, 1940 (13–38). [Department of Agriculture, New South Wales.] I.I.E.

The life history of this wasp is described in detail and notes are included on other insects associated with it in the galls, among which 9 species were also Chalcidoids, 5 of them apparently new.

45.3 : 12.26–8 : 13.2 : 13.15. CAMERON, E. **The biology and post-embryonic development of *Opius ilicis* n. sp., a parasite of the Holly leaf-miner (*Phytomyza ilicis* Curt.).** *Parasitology* 33, 1941 (8–39). R.A.E. A29 (489–90).

An account is given of the bionomics of this parasite of the Holly leaf-miner in England. In a discussion of its value in biological control it is concluded that although *O. ilicis* is inferior as a parasite to *Chrysocharis gemma*, the mortality resulting from the combined parasitism of the two species is greater than that from *C. gemma* alone. The efficiency of *O. ilicis* might possibly be increased under the conditions prevailing in the Holly areas of western Canada, where *Phytomyza ilicis* is a troublesome pest.

45.3 : 12.26–8 : 13.2 : 13.15. DOWNES, W., and ANDISON, H. **The establishment in British Columbia of parasites of the Holly leaf**

miner, *Phytomyza ilicis* Curtis. *J. econ. Ent.* 33, 1940 (948–9). R.A.E. A29 (417).

The parasites *Chrysocharis gemma* Wlk., *C. syma* Wlk., *Sphegigaster flavicornis* Wlk., *Cyrtogaster vulgaris* Wlk., and *Opius ilicis* Nixon were liberated in Victoria in 1936–38 and in the city of Vancouver or its vicinity in 1939. *C. gemma* and *O. ilicis* have definitely become established in Victoria. Notes are included on recoveries of these species in the field and from caged material.

45.3 : 12.26–8 : 13.2. HARTZELL, A., and MCKENNA, G. F. **Preliminary experiments on the control of the Holly leaf miner.** *Contr. Boyce Thompson Inst.* 12, 1941 (119–26).

Among sprays and dusts tested for the control of *Phytomyza ilicis*, a spray consisting of 2 quarts of fish oil and 1 quart of nicotine sulphate, made up to 100 gal. with water, gave a reduction in leaf mines of 91 per cent. as compared with the unsprayed check. Spraying was done in the second and third weeks of May and again in mid-June and mid-July.

45.3 : 12.26–8 : 13.2 : 13.15. HOOD, C. E. **Life history and control of the imported Willow leaf beetle.** *Circ. U.S. Dep. Agric.* No. 572, 1940. pp. 9. [Bureau of Entomology and Plant Quarantine, U.S.D.A.]

Descriptions are given of all stages of *Plagiodera versicolora* (Laich.) and of its life history. *Salix nigra* and *S. alba* var. *vitellina* are the preferred host species, though attacks have also been noted on *S. babylonica*, *S. lucida*, and Poplar. Extreme cold in winter is fatal to adults that are not well protected, and some natural control is also effected by the parasite *Schizonotus sieboldi* (Ratz.). In the New England States spraying should be done between 25th May and 25th June, using 4 lb. of lead arsenate to 100 gal. of water. For later spraying the lead arsenate can be reduced to 3 lb. per 100 gal. of water, but late spraying has the disadvantage that much damage may be done to the trees before they are treated. Fish oil or linseed oil should be added to the spray mixture at the rate of 4 fl. oz. per lb. of lead arsenate. Care should be taken to spray the under side of the foliage, as most of the larvae feed from beneath.

45.3 : 12.26–8 : 13.2. MADRAS. **Annual report on silvicultural research in the Madras Presidency for the year 1939–40.** Supt., Govt. Press, Madras. 1941. pp. 165.

Control measures are recommended for the collar borer of Mahogany, *Pagiophlocus longiclavis*. The most attractive trap material was found to be billets of *Cedrela toona* about 2 ft. long and 6–10 in. in girth. In dry weather the bark of these billets should be loosened, whereas in the monsoon cross-cut billets with bark intact are best (pp. 54–6).

45.3 : 12.26–8. HOFFMANN, C. H. **Additions to annotated lists of insects reared from Elm bark and wood.** *Bull. Brooklyn ent. Soc.* 35, 1940 (54–63). [Bureau of Entomology & Plant Quarantine, U.S.D.A.] I.I.E.

A supplement to previous lists of Elm insects compiled by Kaston [*Bull. Conn. agric. Exp. Sta.* No. 408, 1938 (235–42)] and Pechuman [*Bull. Brooklyn ent. Soc.* 32 (1), 1937 (8–21)]. The present list, which is confined to species actually breeding in Elm bark and wood and to species associated with them, enumerates 89 different insects, mostly Coleoptera and Hymenoptera.

45.3 : 12.26–8 : 13.2 : 13.15. FLANDERS, S. E. **Observations on the biology of the Elm leaf beetle parasite, *Erynnia nitida* R.-Desv.** *J. econ. Ent.* 33, 1940 (947–8). R.A.E. A29 (416).

Notes are given on the life history of this parasite. During the spring and summer of 1939, 31 mated females of *E. nitida* were liberated in a district in California that had been infested with *Galerucella luteola* for only a few years and was free from the pupal parasite *Tetrastichus brevistigma* Gah. They reproduced readily and by the same autumn the parasite appeared to be well established. Of adults of *G. luteola* collected in the field in December, 1939, about 10 per cent. were parasitized, but no parasitized adults survived the winter in an outdoor cage. A high winter mortality of parasitized beetles may have occurred in nature, since *Erynnia* was not recovered from several hundred larvae of *G. luteola* collected in June, 1940, and was not observed in the field. Of hibernating adults collected in December, 1940, however, about 20 per cent. were parasitized. Several males of the native Tachinid *Synaplomyia* (*Aplomyiopsis*) *galerucellae* Villen. were bred from larvae of *G. luteola* taken in the same district in 1937, but no females have been reared. The larvae of this Tachinid are readily distinguishable from those of *E. nitida*.

45.3 : 13.2. PLATEN, VON. Der Maikäfer im Forstamt Reppen, insbesondere seine Bekämpfung mit Effusan im Jahre 1940. [**Cockchafers in the forest district of Reppen, with special reference to their control with Effusan in 1940.**] *Forstwiss. Cbl.* 63, 1941 (25–30, 85–93). [G.]

Report on successful power-dusting in Pine stands.

45.3 : 13.2 : 13.15 : 23.26. HENRY, H. K., and HEIT, C. E. **Flight records of *Phyllophaga* (Coleoptera: Scarabaeidae).** *Ent. News* 51, 1940 (279–82). R.A.E. A29 (432).

Adults of 14 species of *Lachnosterna* (*Phyllophaga*) were taken in experiments with light traps at a nursery in New York State during the period 1934-39. Tables are given to show the numbers taken in each year, the longest flight periods observed, the periods during which 90 per cent. of the 6 commonest species were taken and the percentages of males and females amongst these. The main flight periods of the 3 most important species, *L.* (*P.*) *tristis* F., *L.* (*P.*) *anxia* Lec., and *L.* (*P.*) *fusca* Fröl., occurred in May and June.

45.3 : 13.2 (6). EGGERS, H. Neue Borkenkäfer (Col., Scolytidae) aus Afrika. Nachtrag IX. [**New bark beetles (Col., Scolytidae) from Africa. Supplement IX.**] *Rev. Zool. Bot. afr.* 33, 1940 (99–108). [G.] I.I.E.

Descriptions are given of new species in the genera *Polygraphus*, *Stephanoderes*, *Miocryphalus*, *Coccotrypes*, *Pityophthorus*, *Poecilips*, and *Xyleborus* from the Belgian Congo and some other localities. Three of the species of *Poecilips* are recorded from fruits of *Anopyxis*, seeds of *Annonidium mannii*, and *Erythrophleum africanum*, respectively; otherwise no indication is given of host plants.

45.3 : 13.2 : 13.15 (7). CHAMBERLIN, W. J. **The bark and timber beetles of North America, north of Mexico.** O.S.C. Co-operative Association, Corvallis, Oregon. [1939.] pp. vi + 513. Biol. Abs. 15 (15767).

An account of the taxonomy, biology, and control of North American beetles belonging to the superfamily Scolytoidea, including keys to the families and to many of the genera and species. Natural enemies of the beetles are considered and a list of their recorded parasites is given. Inter-relationships of roundworms and Scolytoidea, entomogenous fungi and bark beetles, predators, etc., are also considered in some detail.

45.3 : 13.2 : 13.15. KÔNO, H. **On the spring host plants of *Prociphilus oriens* Mordv.** *Oyo-Dobuts. Zasshi* 12, 1940 (149–50). [Jap.] R.A.E. A29 (173).

In Hokkaido, *P. oriens* develops on the roots of *Abies* in summer, and overwinters on *Fraxinus* and *Syringa*. The sexuparae have been observed in autumn on other trees, including *Styrax*, *Salix*, *Tilia*, *Celtis*, *Prunus*, and *Ligustrum*, but the fundatrices or the fundatrigeniae are unable to develop on them in the following spring.

45.3 : 13.2 : 07.7. KLOET, G. S. **A new observation nest for wood boring Aculeates (Hym.).** *Ent. mon. Mag.* 77, 1941 (241–4).

Details are given of a proposed method of constructing an 'artificial stump' consisting of a number of separate units that can readily be taken to pieces for observation.

45.3 : 13.2 : 31.43. REES, D. M., and GAUFIN, A. R. **The termite problem in Utah.** *Bull. Univ. Utah* 30 (8), 1939. pp. 7. R.A.E. A29 (400).

The termites that occur in Utah are *Reticulitermes tibialis* Banks, *R. tumiceps* Banks, and *Calotermes minor* Hagen. The first-named is the commonest and has been observed in Salt Lake City feeding on tree and shrub roots, stumps, logs, posts, boards, paper, etc. Control measures are briefly reviewed.

45.3 : 13.2 : 13.15. KAMIYA, K. **On the natural enemies of *Apanteles liparidis* Bouché.** *Oyo-Dobuts. Zasshi* 12, 1940 (120–2). [Jap.] R.A.E. A29 (172).

Notes are given on the natural enemies of *Apanteles liparidis* Bch., which parasitizes *Dendrolimus spectabilis* Btlr. and *Lymantria dispar* L. in Japan.

45.3 : 13.2. SWEETMAN, H. L. **The value of hand control for the tent caterpillars, *Malacosoma americana* Fabr. and *Malacosoma disstria* Hbn. (Lasiocampidae, Lepidoptera).** *Canad. Ent.* 72, 1940 (245–50). R.A.E. A29 (395).

M. americana and *M. disstria* are widely distributed on shrubs and forest trees over most of the United States and Canada, and outbreaks occur at intervals of about 9–12 years. The easiest stages to control are the eggs and larvae. Parasites and predators on the eggs are of minor importance, but numerous larvae and pupae are destroyed by natural enemies, including a wilt disease that often

gives almost complete control of heavy outbreaks but is of less value against light infestations. Epidemics are frequently associated with starvation conditions, caused by defoliation of the food plants. Many larvae are also killed if warm weather in April or early May is followed by a week or more of cool weather. They can be controlled by lead-arsenate sprays applied before serious defoliation occurs, but where such methods are not economic the collection and destruction of the eggs, and especially of the larvae, is effective. Nests of *M. americana* that are close to the ground are easily destroyed by rolling between the gloved hands, and those situated higher on the trees can be pulled down by means of a brush or nail-claws on the end of a pole. Larvae of *M. disstria*, though gregarious, do not form nests but frequently collect, especially on warm days, on the tree trunks, where they can be destroyed.

45.3 : 13.2. GYÖRFI, J. A *Lymantria dispar* L. pusztítása után fellépö másodlagosan káros rovarok. **[Secondary insect pests occurring after attacks by *Lymantria dispar* L.]** *Erdész. Lap.* 80, 1941 (120–3). [Hu.g.f.e.] L.S.

A list is given of 32 species of secondary insect pests that have been identified in Hungarian stands following attacks by *Lymantria dispar*.

45.3 : 13.2 (74). BURGESS, A. F. **The value to uninfested States of gypsy moth control and extermination.** *J. econ. Ent.* 33, 1940 (558–61). R.A.E. A29 (212–3).

A brief account is given of the campaign against *Lymantria dispar* L., carried out since 1906 in the United States by the Federal Government, the New England States, New York, and New Jersey, including the establishment of the barrier zone in 1922. For 16 years the maintenance of this zone and the extermination of outlying infestations have prevented the general westward spread of the moth and protected unaffected States from loss of trees and the expense of control. The present situation, however, is serious. Reduced funds and a greatly diminished staff for control work, combined with increasing infestation near and within the barrier zone, will render the barrier zone and the work that is being done ineffective to protect the rest of the country. It is suggested that States that have been protected for many years should give some help towards the campaign.

45.3 : 13.2 : 13.15. KÔNO, H., and SUGIHARA, Y. **Observations on the oviposition of *Porthetria dispar* L.** *Oyo-Dobuts. Zasshi* 12, 1940 (69–74). [Jap.] R.A.E. A29 (171).

An account is given of observations at Sapporo on the oviposition habits of *Lymantria* (*Porthetria*) *dispar* L. during a recent outbreak in Hokkaido. The egg masses were scarce on most trees but abundant on hedges of Larch. They occurred mainly among dense foliage at the base of Larches surrounded by grass and were most numerous within 16 in. of the ground, very few being found at heights greater than 32 in.

45.3 : 33.36.1 : 31.43. RICHARDSON, C. H. **Advances in entomology.** *Industr. Engng. Chem.* (*News Ed.*) 19, 1941 (77–88). R.A.E. A29 (483).

A review of papers dealing with recent work, chiefly on insecticides. It is arranged under the headings:—stomach poisons; contact poisons; control of termites and other wood-infesting insects; insecticides of plant origin; wetting and spreading of sprays; fumigants; attractants and repellants; methods for testing insecticides and evaluating toxicological data; reviews.

45.3 : 44.3. HAMILTON, C. C. [Editor.] **Entoma: a directory of insect pest control.** Eastern Branch of the American Association of Economic Entomologists [obtainable through the editor, New Jersey Agricultural Experiment Station, New Brunswick, N.J.]. 4th ed., 1941. pp. 195 + 2. P.R.

Comprising general information on insecticides and fungicides, and directories of firms dealing in such materials and in machinery and other equipment; of entomological services and societies, agricultural experiment stations, and commercial companies specializing in arboriculture and pest control; a list of trade-marked insecticides, fungicides and adjuncts; a list of insecticide and fungicide manufacturers and accessory companies; and an index to advertisements.

47. COLLECTIVE INJURIES TO INDIVIDUAL TREE SPECIES

47. FRIEND, W. H. **A simple method of making tree injections.** *Proc. Amer. Soc. hort. Sci. 1940*, 38, 1941 (203–4). [Agricultural Exp. Sta., Weslaco, Tex.] E.M.B.

The method described consists in inserting lengths of large-bore rubber hose (those used

were about 3 ft. long and $\frac{5}{8}$ in. in diameter) into auger holes made in the trunk, and filling with the desired solution. To prevent leaking, the holes should be made slightly smaller than the outside diameter of the hose; their depth and number must depend on attendant circumstances. The free end of the hose should be supported 2 ft. or more above the point of insertion by tying to stakes or to the tree itself. Several chemicals have been injected by this method into *Citrus* trees affected with various disorders, and beneficial results have been observed in some cases.

47 : 12.25 : 24.51. AUSTRALIA. **Annual report of the Commonwealth Forestry Bureau for year** 1940. Govt. Printer, Canberra. 1941. pp. 16.

On certain sites the health of *Pinus radiata* plantations has been greatly improved by applications of zinc sulphate, while severe pruning of trees on a 'dieback' site has prevented the death of leaders of pruned trees (p. 11).

47 : 23.27. CHAMBERS, E. L., and THOMPSON, N. F. **Pests and diseases of trees and shrubs.** *Bull. Wis. Dep. Agric.* No. 213, 1940. pp. 87.

A semi-popular bulletin for horticulturists, containing general information on the subject of pests and diseases followed by descriptions of each pest or disease with recommended control measures.

47 : 23.27. PIRONE, P. P.; WELCH, D. S. **Diagnosing shade tree troubles.** *Shade Tree* 14 (3), 1941 (1–3; 3–6).

Each of these authors gives a brief outline of the type and sequence of observations to be made in diagnosing tree disorders.

5. MENSURATION. INCREMENT. YIELD

51. WEIGHTS AND MEASURES

51 : 52 : 53 : 32.3 : 32.81 : 33.91. FERGUSON, J. H. A., and HELLINGA, G. Handelsvolume van hout. **[The trade volume of timber.]** *Tectona* 34, 1941 (109–99). [Du.]

This paper is concerned primarily with the detailed elucidation of the relation between the trade or 'customary' volume and the true or 'actual' volume of timber as expressed under the different systems of measures and methods of scaling employed in different countries. It is emphasized throughout that knowledge of the method of scaling is of the utmost importance in this connexion, particularly when dealing with measures of round timber. The first chapter contains a brief historical review of old measures and of efforts towards standardization. The second deals with the chief weights and measures employed, special notes being appended on the terms ton, load, board foot, standard, and cord, which are particularly likely to cause confusion. In the third chapter a general discussion is presented of different methods of scaling, supplemented in chapter 4 by a description of methods of measurement and scaling arranged by countries. The fifth and last chapter is devoted to a brief account of grading and sorting. In the appendices are given a number of conversion tables for reducing (i) inches to centimeters, (ii) English feet to metres, (iii) stems per acre to stems per hectare, (iv) square feet per acre to square metres per hectare, (v) cubic feet per acre to cubic metres per hectare, (vi) board feet per acre to cubic metres per hectare, (vii) cubic feet to cubic metres, (viii) board feet to cubic metres, and (ix) acres to hectares. There is a bibliography of 74 references.

52. MEASUREMENT OF TREES AND TIMBER

52.1. *Diameter*

52.1 : 12.25. RAPRAEGER, E. F. **Determining tree d.b.h. from stump measurements.** *Res. Note Nth. Rocky Mt. For. & Range Exp. Sta.* No. 16, 1941. p. 1 + gphs.

Charts are given showing the relationship between stump size and tree diameter of trees of normal shape for Western White Pine, Ponderosa Pine, Western Larch, Douglas Fir and Engelmann Spruce.

52.2. *Height. Length*

52.2 : 07.7. HOLDSWORTH, R. P. **An adaptation of the Christen hypsometer.** *J. For.* 39, 1941 (721–2). [Massachusetts State College.]

A note on the construction and use of a hypsometer that has been found to give a high degree of accuracy within the limits of the Christen hypsometer, and that is easily constructed and efficient in use.

52.4. *Measurement of Volume*

52.43.2 : 01.7. LEXEN, B. **The application of sampling to log scaling.** *J. For.* 39, 1941 (624–31). [Rocky Mt. Forest & Range Exp. Sta.]

From a study of the application of sampling technique to scaling Ponderosa and Lodgepole Pine logs, it was found that a simple sample of 2 per cent. provides a fair estimate of the total, but that more refined and intensified sampling is necessary to estimate true volume within allowable limits. Desirable sampling technique includes: (1) Stratification, which reduces error variance about 20 per cent ; (2) selection of samples in single-log units; and (3) use of samples large enough to reduce error to an acceptable minimum. Correction for variable log length resulted in minor improvement in the estimate but not enough to justify the additional work involved.

A sample of 1,000 logs was found to be large enough to yield a reliable estimate of the total volume of any number of logs. Since it is necessary to scale at least 1,000 logs sampling probably fails to result in a saving of time where less than 5,000 logs are involved. Until sampling technique is further improved, sampling less than 5,000 logs is not recommended. Sampling was found equally effective when applied to either Lodgepole or Ponderosa Pine. No appreciable difference was found between the errors of mechanical and random samples. Since mechanical sampling is more easily applied in practice it is recommended for sample log scaling. *Author's summary.*

52.43.2 : 33.15 : 53. **Smith's pitprop tables, home timber.** National Home Grown Timber Council, London. 1939. pp. 28.

These tables give (1) the contents per piece for each size of prop commonly used, and for long timber that may be cut into props; (2) the solid contents of 100 linear feet of each size of prop and their relation to weight according to the state of seasoning; and (3) the quantity of timber, by linear feet and by number of props, which will weigh 4 tons at the average state of seasoning represented by the term '50 Hoppus feet to the ton weight'. The tables are calculated for a taper of 1 in. of diameter in 7 linear feet.

52.43.2. WILSON, S. E. **Decimal Hoppus tables, showing the solid contents of round timber in Hoppus feet and decimals.** Scientific Computing Service Ltd., London. 1941. pp. 60.

52.43.3 : 12.26–8. STRUGNELL, E. J. **Volume tables—Keruing.** *Malay. For.* 10, 1941 (97–8).

Figures based on measurements of *Dipterocarpus cornutus, D. sublamellatus*, and *D. crinitus* are presented.

52.43.3 : 12.26–8. SCHRAMM, W. O., and KELLOGG, L. F. **Local volume table for Black Walnut (*Juglans nigra*) in Franklin County, Ohio.** *Tech. Note cent. St. For. Exp. Sta.* No. 31, 1941. p. 1.

52.43.3 : 12.26–8. BARRETT, L. I., and BUELL, J. H. **Oak topwood volume tables.** *Tech. Note Appal. For. Exp. Sta.* No. 48, 1941. pp. 3 + tbls.

The tables are based on data obtained from Oak (*Quercus* spp.) in North Carolina and can be used for estimating the volume, exclusive of bark, of topwood in cu. ft. or stacked units from d.b.h. and merchantable height or from d.b.h. alone. Volumes including bark and cord volumes may be obtained by the use of converting factors which are given.

52.43.3 : 12.26–8. CRAWMER, J. R., and KELLOGG, L. F. **Local volume table for Red Oak (*Quercus borealis*) in Holmes County, Ohio.** *Tech. Note cent. St. For. Exp. Sta.* No. 33, 1941. p. 1.

52.43.3 : 12.26–8. NABLO, S. U. **A commercial volume table for Mayapis.** *Philipp. J. For.* 3, 1940 (451–69). [Bureau of Forestry, Philippines.]

Volume table for *Shorea squamata* (Turcz.) Dyer in Northern Laguna, Pañgil, prepared by the alinement-chart method.

53. SOLID CONTENTS OF STACKED MATERIALS. REDUCING FACTORS

53 : 51. **Measurement of stacks of wood billets.** *Mon. News Lett. Div. For. Prod. Aust.* No. 116, 1941 (1).

In Australia stacked billets are measured by a cord of 125 cu. ft. (5 ft. × 5 ft. × 5 ft.) or by a 'ton' of 50 or sometimes 40 cu. ft., while certain municipalities require firewood to be sold by weight.

54. FACTORS CONNECTED WITH ASSORTMENT

54 : 12.25. NEUNHOEFFER, H. Vergleich zweier Fichten-Stammsortentafeln. **[Comparison of two stem-assortment tables for**

Spruce.] *Allg. Forst- u. Jagdztg.* 117, 1941 (186–94). [G.]

The considerable disagreement in detail between Mitscherlich's table [cf. *For. Abs.* 2 (78)] and Lang's table [*Allg. Forst- u. Jagdztg.* 114, 1938 (161 *et seq.*)] is discussed with special reference to differences in the technique of preparing the tables. It is shown, however, that much the same result is arrived at in estimating the total value of a stand using either of the two tables.

56. INCREMENT

56 : 52.43.4 : 01.7. KRENN, K. Die Hohenadl'schen Mittelstämme als Zuwachsmittelstämme und ihre Bedeutung für die Praxis der Zuwachsermittlung an Beständen. **[Hohenadl mean trees as mean trees for increment studies and their significance in the practical determination of the increment of stands.]** *Allg. Forst- u. Jagdztg.* 117, 1941 (213–30, 243–63, 279–87). [G.g.] [Badische Forstl. Versuchsanstalt der Universität Freiburg i. Br.]

Using sets of data from several stands remeasured at intervals, it is shown that the assumption in Hohenadl's method [cf. *For. Abs.* 1 (192)] that the two mean trees may be used for determining the increment of the stand during the preceding period (diameter, basal-area, and volume increments for, say, the last ten years or less) is correct. It is further shown that, for short periods, a linear correlation may be taken to exist between the diameter increment of stems of a given diameter class during a period and their diameter at the end of that period, and between their volume increment and their basal-area increment during a period, the position of these two curves for a given stand being determinable by Hohenadl's method; that, at least for Spruce, Hohenadl's method may also be used for determining the current value increment of a stand; and that for short periods the correlation between the value increment and the basal-area increment of stems of a given diameter class is approximately linear, the position of this curve for a given stand being also determinable by Hohenadl's method. The paper also includes a discussion of the errors involved in determining current stand increment. Finally, it is pointed out that Hohenadl's method may be combined with the volume-curve method of Kopetzky-Gehrhardt if it is desired to determine the volume of the different diameter classes as well as that of the entire stand.

56.02 : 11.21 : 11.14.2–3 : 12.26–8. FRIESNER, R. C. and G. M. **Relation of annual ring formation to rainfall, as illustrated in six species of trees in Marshall County, Indiana.** *Butler Univ. bot. Stud.* 5, 1941 (95–112). L.S.

(i) Correlation between width of annual rings and rainfall is studied in stump and stem sections from 17 specimens of *Quercus borealis maxima*, 4 of *Q. alba*, 6 of *Fraxinus americana*, 2 of *Acer saccharum* and 1 each of *Carya cordiformis* and *Liriodendron tulipifera* from Marshall County, Indiana. (ii) The highest percentage of correlation for most specimens was with rainfall for either June–August or the single month of June, but individual exceptions are found in which the highest correlation is with other rainfall periods. In the case of *Q. alba* a slightly higher percentage of correlation occurs with the rainfall in the period November–October in 3 of the 4 specimens studied. (iii) When rainfall for one year or a particular period of that year is conspicuously greater than for the preceding year, growth is also greater in from 50 to 72 per cent. of the years; but when the rainfall for corresponding periods is conspicuously less than for the preceding year, growth is also less in from 62 to 82 per cent. of the years. (iv) When rainfall for one year or a particular period of that year is conspicuously greater or conspicuously less than for the preceding year, growth is greater or less, respectively, in a large percentage of the individual trees; but some years are found in which the percentage of individual trees showing such correlation is very small. This lack of correlation is due to the distribution of rainfall failing to coincide with the vegetative year. (v) In years when there is 90–100 per cent. agreement amongst the individual trees, increase in growth is correlated with increase in rainfall and decrease in growth with decrease in rainfall for nearly all month-combinations. The correlation is perfect for June–August rainfall except for 1922, 1923, and 1931, during which years the rainfall for the month-combinations August to July of the following year forms perfect correlation. *Authors' summary.*

56.02 : 11.21 : 12.25. MEYER, H. A. **A tree-ring calendar for Hemlock.** *For. Leaves* 31 (4), 1941 (7). [Pennsylvania State College.]

Annual rings were measured to the nearest

$\frac{1}{200}$ of an inch along three radii of cross-sections of Hemlock obtained from two centres in Pennsylvania 100 miles apart. The average of ring-width measurements for each year were plotted and curves were fitted. Weather was found to be responsible for 90 per cent. of the variation around the curve for one set of measurements from trees 300 years old, and for 70 per cent. of the deviations for the second set of data from trees 200 years old.

57. DEVELOPMENT AND STRUCTURE OF STANDS. YIELD

57.0 : 12.25 : 64. MILES, C. **Growth of Douglas Fir in eastern Idaho.** *J. For.* 39, 1941 (689–92). [U.S. Forest Service.]

(i) In Douglas Fir stands on sites 4, 5 and 6 (site classification—Region 4, U.S. Forest Service), there is a certain reserved volume per acre which yields maximum net increment. Greater or lesser reserved volumes yield less. This optimum reserved volume varies directly as site—the better the site the greater this volume. (ii) In Douglas Fir stands on sites 4, 5 and 6, net annual increment reaches a maximum during the fifth, sixth or seventh decade after the initial cut and then declines. The greater the reserve volume the earlier this maximum is reached. (iii) Poles and reproduction contribute almost one-fourth the total volume attained at the end of the sixth decade after initial cut. (iv) Mortality in Douglas Fir will average 16 per cent. of original reserved volume in 60 years after cutting with 38 per cent. of this in the first decade. *Author's summary.*

6. MANAGEMENT. WORKING PLANS. SURVEYS

60. GENERAL LAND MANAGEMENT

60 : 97.1 : 91.3 : 91.4 : 11.47.6 : 11.62. STAPLES R. R. **Anti-tsetse clearing and land use.** *E. Afr. agric. J.* 7, 1941–42 (48–50). [Agricultural Department, Tanganyika.]

General experience and research data obtained in East Africa suggest that bush clearing in the dry, deciduous grass woodland and thicket zones—the *Brachystegia* (Myombo), *Combretum*, or *Acacia* associations—and the thorny thicket types of vegetation, is not only an effective anti-tsetse measure, but also favours improved land use. Under a mixture of perennial and annual grasses, grazed land is less susceptible to run-off and erosion than under bush; a grass ley is equal or even superior to a bush ley for restoring soil fertility following cultivation; the stock-carrying capacity of the land is increased; and the amount of rain water contributing to ground-water supplies is at least as great as under the original bush.

60.3. *Management of Different Classes of Forest*

60.31.1 : 12.25 : 12.19 (82). TORTORELLI, L. A. Importancia económica de la explotación racional de los bosques de Araucaria del Sud. **[The economic importance of rational exploitation of the forests of *Araucaria araucana* (Molina) Koch.]** *Maderil* 13 (156), 1941 (11–6, 25–7). [Span.]

The geographical distribution, biology, and ecology of *A. araucana* are discussed briefly with special reference to the readily exploitable stands owned by the Argentine State. These stands, with an area of approximately 11,000 ha., represent a timber volume of about 3 million cu. m. It is estimated that, with selective fellings on a theoretical rotation of 116 years, 12,000 cu. m. of sawn timber would be produced annually. The timber could be extracted, manufactured, and transported to Buenos Aires at a cost less than half of the wholesale price prevailing in that market.

60.31.2 : 11.62.11 : 96 : 97.2 (76.2). BROWN, R. F. **Forestry in the soil conservation program in northern Mississippi.** *J. For.* 39, 1941 (598–600). [Soil Conservation Service.]

In farm improvement planning, consideration must be given to a number of forestry problems and to their interrelation with the economy of the farm as a whole. These include woodlot improvement and management, the supply of wood requirements, the disposal of surplus wood, and reforestation. Present methods of dealing with such problems in northern Mississippi are outlined.

60.31.2 : 2 : 5 (73). **The forestry phase of farm planning: handbook (for planning technicians of the Soil Conservation Service in Region 2).** U.S. Department of Agriculture, Soil Conservation Service, Region 2, Spartanburg, S.C. 1940. pp. 62.

A handbook prepared for use by farm planning technicians, as an aid to the analysis of common woodland conditions and the prescription of essential practices. The forestry duties of planning technicians are outlined and several volume tables and other useful data are included. The final section contains a brief discussion of the fundamentals of woodland management in relation to soil and moisture conservation and land use.

61. SURVEYING. MAPPING

61.31 : 07.7. DENGLER, H. W. **A simple range-finding device.** *J. For.* 39, 1941 (725).

The device consists of a strip of transparent material such as celluloid, about 3 in. × ½ in., on which are carefully scratched two vertical and two horizontal parallel lines, the distance between each set of lines being determined by the user's reach. When held at arm's length in front of the eye the sets of parallel lines should intercept either a horizontal or vertical distance of 1 ft. for each 100 ft. of distance.

61.31 : 44.3 : 12.25 : 12.21. MITCHELL, J. N. **A manual of compass and tape surveying for use in blister rust control work.** Oakland, U.S. Bureau of Entomology & Plant Quarantine, Division of Plant Disease Control. 1941. pp. 52. Univ. Calif. Coll. Agric. For. Dep. Library Accessions List 6 (9), 1941 (3).

61.31 : 52.43.5. WILSON, E. **A simple technique for laying out sample plots.** *J. For.* 39, 1941 (650–1).

The plot is in the shape of an equilateral triangle, 158·58 ft. on the side and one-quarter acre in area. In timber cruising the base of the plot is established on the cruise line at the proper interval and marked with two stakes. The altitude (137·34 ft.) is run out from the centre of the base and the caliper men are kept within the triangle by the tallyman sighting along the side from one corner picket to another. The plot can be laid out quickly and easily and the liability of error is much reduced in comparison with that of other methods.

61.31 : 61.4. WIESEHUEGEL, E. G. **An economical forest inventory method.** *J. For.* 39, 1941 (672–6). [Tennessee Valley Authority.]

The method described is for use in areas where planimetric maps or aerial mosaics are available and where there is a complete system of secondary roads. In the forest inventory of the Tennessee Valley area described, a standard field crew of two men with a car was used in traversing the roads and noting type boundaries and gross mensurational data in code on planimetric maps of a scale of about 1 : 24,000. One-fifth-acre sample plots were established in representative stands as a check on estimates and to obtain stand-table, growth, and mortality data. An average of 31,000 acres was covered per crew day. Cull studies were made separately by special crews. The field code used makes possible analysis of field data by means of Hollerith punch cards. The cost of this method of survey compares favourably with that of other methods.

64. DESCRIPTION OF SITE. ASSESSMENT OF SITE AND STAND QUALITY

64 : 12.19.2 : 11.4 : 11.2 : 60.3 : 97.1 (71.4). HEIMBURGER, C. C. **Forest-site classification and soil investigation on Lake Edward Forest Experimental Area.** *Silvic. Res. Note Dom. For. Serv.* No. 66, 1941. pp. 60.

A detailed report of a study of the forest conditions, soils and vegetation within the Lake Edward Forest Experimental Area, Quebec, undertaken with the object of identifying forest-site (indicator) types and of classifying the area by these types as a basis for future management and experimental work. Four main upland indicator types were established and named after representative species of ground and shrub vegetation as the *Cornus*, *Oxalis*/*Cornus*, *Viburnum*/*Oxalis* and *Viburnum* types. These are described and field data are analysed to determine the degree of correlation between these site types and topographic features, forest stand composition and certain edaphic factors.

A general description is given of the climatic region represented by the Lake Edward Forest Experimental Area and to which the results of the present study might be applied, and the factors affecting forest management possibilities in this region are discussed. [Cf. *For. Abs.* 1 (26), 3 (178).]

7. FOREST ECONOMICS, VALUATION, AND FINANCE

78. CALCULATION OF PRESENT AND FUTURE VALUES

78 : 73. ROTHERY, J. E. **Some interest factors.** *J. For.* 39, 1941 (680–4). [U.S. Forest Service.]

The sinking-fund and compound-interest methods of computing present worth for purposes of liquidating investments are discussed. A table of factors is given for computing the present worth of investments at different rates of interest and for periods up to 25 years.

8. ADMINISTRATION

82. LABOUR QUESTIONS

82. RIVARD, P. **First aid supplies for logging camps.** *Pulp Paper Mag. Can.* 42, 1941 (482–3).

82 (71.4). COOK, A. S. **What is being done to control accidents and accident costs in woods operations.** *23rd Annual Meeting Proceedings, Woodlands Section, Canadian Pulp & Paper Association* No. 616 (H–2), 1941 (23–7). [Quebec Pulp & Paper Safety Association.]

With particular reference to accident prevention on pulpwood operations in Quebec Province.

82 : 32. STAMM, E. P. **Responsibility of management for safe logging conditions.** *W. Cst. Lumberm.* 68 (10), 1941 (46). [Crown-Zellerbach Corp., Portland, Ore.]

Every logging organization should have a proper safety programme and see that it is put into effect. Points that should be covered in such a programme are listed.

82 : 32.9. DRAKE, G. L. **Hazards of tractor and high-lead logging.** *W. Cst. Lumberm.* 68 (10), 1941 (48–50).

While logging hazards vary with conditions of operation, the analysis of accidents on a single operation indicate a higher percentage of accidents with high-lead logging than with tractor logging. The causes of logging accidents are discussed and various precautions suggested.

82 : 33.1 : 12.26–8. DAVIDSON, J. M. **Toxic effects of Iroko, an African wood.** *Lancet* 240, 1941 (38–9). L.S.

Iroko (*Chlorophora excelsa*) is reported as as the cause of a recent outbreak of skin disorders in a large modern woodworking establishment. Well seasoned Iroko imported as planks had been handled intermittently for some years without ill effect. The timber responsible for the skin troubles had been imported in log form, necessitating sawing on the premises, and the dust from it was moister than usual and thus tended to adhere more readily to the skin. Of more than 50 men handling this wood in the machine shop nearly all had irritation of exposed skin surfaces and 9 of them had more severe symptoms. Measures suggested to limit the future incidence of such cases include careful attention to dust extraction, provision of light-weight respirators, use of protective clothing fitting closely at the neck and wrists, and provision of good washing facilities.

82 (485) : 91.8. HAMMARSTRAND, E. Skogsarbetarna och deras löner. **[Forest workers and their wages.]** *Skogen* 28, 1941 (172). [Sw.] L.S.

Examples given in this note show that while the cost of living rose in Sweden by 26 per cent. in 1940–41 as compared with 1935–36, the wages of forest workers increased by 86–87 per cent. over the same period. Throughout the period, except for the year 1938–39, there has been a steady upward trend in wages. The improvement on the low wage levels obtaining at the start of the period is regarded as satisfactory, though better housing and better distribution of work over the year are still desirable to attract labour to the forests.

9. FOREST POLICY

90. GENERAL PRINCIPLES OF FOREST POLICY

90 (410). HILEY, W. E. **The future of forestry.** *Repr.* from *The Field*, Apr., 1941. pp. 11.

The policy advocated includes measures for increasing the security of land ownership in Britain, notably a reform of the present system of death duties, and State control of, and assistance in, the management of private woodlands.

90 (497.1). PERUŠIĆ, A. Iz naše šumarske politike. **[On our forest policy.]** *Šumarski List* 64, 1940 (57–110). [Croat.f.] L.S.

A critical review is made of the development of the forest policy of Yugoslavia since the Great War, and measures for improvement are suggested.

90 (59.5). STEUP, F. K. M. Iets over boschpolitiek in Britisch Malaya. **[Notes on forest policy in British Malaya.]** *Tectona* 33, 1940 (607–15). [Du.]

This brief review is based upon annual reports, Sir Lewis Fermor's 'Report upon the Mining Industry of Malaya', and the papers by Hodgson and Watson noted in *For. Abs.* 1 (302 and 306, respectively). The efforts to adjust tin-mining and forestry interests are commended. Regeneration policy is discussed with emphasis upon the contrast between the natural regeneration methods favoured in Malaya and the plantation methods prevailing in the Dutch East Indies. It is thought that the Malayan methods of natural regeneration might prove too expensive and require too large a staff for use in the Dutch possessions. The general management policy of Malaya is outlined and some doubt is thrown upon the adequacy of the present programme to meet the possible future needs of the Malayan States, at least within the contemplated period.

90 (73). **Forest lands of the United States.** Hearings before the Joint Committee on Forestry, Congress of the United States Seventy-sixth Congress, Third Session, on S. Con. Res. 31 (75th Congress) and H. Con. Res. 11 and 23 (76th Congress) concurrent resolutions to establish a Joint Committee on Forestry. Govt. Printing Office, Washington, D.C. 1940. Pts. 3, pp. 443–539; 4, pp. 541–671; 5, pp. 673–982; 6, pp. 983–1267; 7, pp. 1269–1589; 8, pp. 1591–2016; & 9, pp. 2017–2163.

90 (73). **Forest lands of the United States.** Report of the Joint Committee on Forestry, Congress of the United States, pursuant to S. Con. Res. 31 (75th Congress), H. Con. Res. 11, 23, and 51 (76th Congress), authorizing and directing the Committee to study and make investigation of the present and prospective situation with respect to the forest land of the United States, its condition, ownership, and management, as it affects a balanced timber budget, watershed protection, flood control, and other commodities, and social economic benefits which may be derived from such land. Govt. Printing Office, Washington, D.C. 1941. pp. v + 44. 77th Congress, 1st Session. Senate, Document No. 32.

90 (79.4) : 94.11. PRATT, M. B. **Desirable objectives in a State forest program for California.**—With comments by C. R. Tillotson. *J. For.* 39, 1941 (609–14).

A brief discussion of present and proposed practice in regard to fire protection, acquisition of State forests and other forest problems in California, together with a list of the objectives of State forestry as suggested by the author for that State.

90 (81). SOBRINHO, V. O problema florestal do Nordeste. **[Forestry problems in north-eastern Brazil.]** *Bol. Secretaria de Agr., Ind. & Com., Recife* 6 (2), 1940 (146–56); *Trop. Woods* No. 67, 1941 (38).

Consideration of the forestry problems of north-eastern Brazil, particularly Pernambuco, and a proposed programme for the State forest service.

91. SOCIAL AND ECONOMIC SIGNIFICANCE OF THE FOREST

91.1. *Rural Preservation. Reserves. National Parks. Plant and Animal Protection*

91.1 (73). KENDEIGH, S. C. **Natural and wilderness areas within the National Forests.** *Ecology* 22, 1941 (339–42).

'Natural areas' are tracts set aside for the permanent preservation of characteristic ecological complexes for scientific and educational purposes. The general public is admitted but

not encouraged. The only major interferences with the environment are fire protection and protection from diseases and insect pests in epidemic proportions. In 1940 the United States had 41 such areas, aggregating 47,549 acres. The distribution of these is shown on a map, and further details of their individual location, acreage, and chief vegetation types are presented in tabular form. 'Wilderness areas' of more than 100,000 acres each, and 'wild areas' of 5,000–100,000 acres each, are also available to supplement the 'natural areas' for scientific study, though they are intended primarily for recreation. By 1940, 30 'wilderness areas' aggregating 11,739,000 acres, and 42 'wild areas' aggregating 1,964,000 acres had been established.

91.7. *The Forest as a Source of Raw Materials*

91.7 (410) : 90. GODWIN, G. **Our woods in war.** Acorn Press, Cambridge. 1940. pp. 116.

A well written popular account of the utility of forests with special reference to the present position in Great Britain. The author favours a policy of State control over the private forests of Britain and urges the establishment of woodland camps for 'youths caught in the No-Man's Land between school and compulsory military service' as well as the use of any other available labour for replanting and forestry work in general.

92. FOREST LAW

92 (410) : 95.4. **War Damage Act, 1941 (Part II). Insurance of woodlands and plantations.** *J. Land Agents' Soc.* 40, 1941 (289–91).

92 (43.7 : 43.1–7) : 99. Die neue Rechts- und Wirtschaftsordnung im Sudetengau. Ein Überblick über die Entwicklung seit der Eingliederung der sudetendeutschen Gebiete in das Grossdeutsche Reich. **[The new legal and economic order in the Sudetengau. A review of developments in the Sudeten-German regions since their incorporation into Greater Germany.]** *Thar. forstl. Jb.* 91, 1940 (471–8). [G.] R.M.I.

92 (68). UNION OF SOUTH AFRICA. **Forest and Veld Conservation Act, 1941.** (No. 13 of 1941). *Union of South Africa Government Gazette* 124 (2890), 1941 (14–41). [E.Afr.]

An act 'to amend and consolidate the laws in the Union relating to tenure, demarcation, protection, management and utilization of forests and the regulation of veld-burning, to regulate trade in, and the use of trade names and marks in connexion with forest produce, to control the exportation and importation thereof, and to make better provision for veld, soil, and water conservation'.

92 (68) : 61.3. UNION OF SOUTH AFRICA. **Land Survey Amendment Act, 1941.** (No. 14 of 1941). *Union of South Africa Government Gazette* 124 (2890), 1941 (42–55). [E.Afr.]

92 (71.11) : 43.1. ALBERTA. **An act to amend and consolidate an act for the prevention of prairie and forest fires.** 1941 Chapter 67. ['The Forest and Prairie Fires Prevention Act, 1941'.] King's Printer, Edmonton. 1941. pp. 14.

92 (71.4). QUEBEC. **An act to amend the Lands and Forests Act.** The Legislative Assembly of Quebec Bill No. 34. King's Printer, Quebec. 1941. pp. 3.

Section 1 of the Bill authorizes a reduction in stumpage dues to timber-limit holders who undertake silvicultural work under the direction of forestry engineers. Section 2 provides for the acquisition of lands necessary for forestry instruction. Section 3 allows, in certain cases, an increase in the volume of timber cut by special permit, to a maximum of 300,000 cu. ft. Sections 4 and 5 ensure the permanence of township reserves. Section 6 grants the requisite powers to establish township reserves and forest settlements.

94. FOREST OWNERSHIP. CO-OPERATIVES

94.3 : 94.4 : 35 : 98 (485). WAHLSTEEN, H. Sveriges Skogsägareföreningarnas Riksförbund. **[The Swedish National Union of Forest Owners' Associations.]** *Skogsägaren* 17, 1941 (91–3, 108–10). [Sw.]

The National Union of Forest Owners' Associations (Skogsägareföreningarnas Riksförbund) was founded in 1932 as a means of dealing with questions of general interest to the component Associations, few of which were at that time business co-operatives. As, however, the majority subsequently developed into co-operatives, it became desirable to have a central economic body able to deal with actual business

transactions, and especially with large-scale transactions in which the vendor might be represented by a number of Associations. In autumn, 1938, the National Union was therefore reorganized and its name changed to the 'Swedish National Union of Forest Owners' Associations' (Sveriges Skogsägareföreningarnas Riksförbund—or S.S.R.), whose declared aims were (i) to act as a trade agency in forest products on behalf of its members; (ii) to guard and to further the common interests and objects of the Forest Owners' Associations, particularly by representing their views to government and other bodies; (iii) to act as an advisory body to the member Associations. This central organization is now composed of 13 members, 11 of whom are appointed by the member Associations and 2 by other rural unions. Members are appointed for two years and can be re-elected. The full board is required to meet at least twice a year, but a large amount of the work is carried on either by the secretary or an executive council. The Union's activities are financed by subscriptions from the member Associations, each Association making a deposit based on the area of productive forest land that it represents and paying an annual due calculated in percentage of its gross turnover for the preceding year. The weekly '*Jordbrukarnas Föreningsblad*' and the monthly '*Skogsägaren*' serve as the Union's official channels of publication. The member Associations number 30, or practically all of the Forest Owners' Associations existing in Sweden, and the total number of members in 1939 was 27,304, representing a productive-forest area of 2·02 million ha. A table is given to show the percentage by number of members owning various sizes of estate in three selected Associations from different parts of Sweden: in each case by far the largest percentage of owners have estates below 100 ha. in area. The Union's activities have already borne fruit. In 1937, for instance, it entered into negotiations with foreign buyers and secured contracts for pulpwood and pitprops for which little Swedish demand existed at that time. It has also been active in expediting the distribution of fuelwood under the present emergency conditions. A price-information service has been set up for the use of the central body and the member Associations, and much publicity has been secured by means of lectures, newspaper articles, statements to official organizations, etc.

97. POLICY REGARDING THE RELATION OF THE FOREST TO AGRICULTURE, PASTURE, AND INDUSTRY

97.1 (74.8). PITKIN, F. A. **Forests and State planning.** *Forest Leaves* 31 (5), 1941 (1–2, 15–6). [Pennsylvania Department of Commerce.]

In 1934 the State Planning Board for Pennsylvania developed a preliminary land-use plan for that State. The recommendations made in respect of forest land use are here summarized.

97.1 (729.7). BROOKS, R. L. **The Lands Advisory Committee of Trinidad.** *Emp. For. J.* 20, 1941 (60–2).

A brief account of the origin of this committee and of the major problems with which it is concerned, including a soil and vegetational survey, soil conservation, and co-ordination of the possibly conflicting requirements of petroleum exploitation and forestry.

97.1 (729.7) : 61.3 : 11.45.9. BEARD, J. S. **Land-utilization survey of Trinidad.** *Carib. For.* 2, 1941 (182–7). [E.e.span.]

It is hoped that the land-utilization survey now in preparation will assist considerably in forming a sound policy of settlement, land alienation, and forest reservation.

97.1 : 60 (73). HOLDSWORTH, R. P. **Multiple use management applied to timberlands.** *J. For.* 39, 1941 (799–802). [Massachusetts State College.]

97.1 : 60 : 34.3 : 91. DAVENPORT, L. A. **Timber vs. wildlife.** *J. For.* 39, 1941 (661–6). [Michigan Department of Conservation.]

A critical discussion of land-use policies in the United States, particularly of 'multi-purpose' forestry and its possible effect on game management.

97.1 : 60.31.2 : 94.3 (485). Förslaget om skogsstyrelse godkänt. [**Proposal for a Forestry Board approved.**] *Skogsägaren* 17, 1941 (107). [Sw.]

The motion to replace the Central Council of the Union of County Forestry Boards by a State body to be known as the Forestry Board [cf. *For. Abs.* 3 (182)] has now been passed by the Swedish parliament. The higher executive of 5 members will have the power to co-opt such additional experts as it may require to deal with special problems. In

order to maintain contact with the County Forestry Boards, it is expected that representatives of these will be called in for consultation on suitable occasions.

97.1 : 60.31.2 : 94.3 (73). **Report of Committee on Private Forestry, Allegheny Section, Society of American Foresters.** *J. For.* 39, 1941 (595–7).

With the object of improving the management of private forest lands, a Government policy is proposed in respect of protection, research, public land acquisition, public sale of timber, education, summer employment of students, and technical assistance in the management of private forest lands.

97.1 : 60.31.2 : 94.3 (73). GOODMAN, R. B. **Evolution in forest regulation.** *J. For.* 39, 1941 (615–7).

A further discussion of the factors relating to public regulation of privately owned forests in the United States. [Cf. *For. Abs.* 3 (91).]

97.1 : 60.31.2 : 94.3 (78.9 : 79.1). LIBBY, J. A. **The private land forestry problem in the Southwest.** *J. For.* 39, 1941 (620–3). [Soil Conservation Service.]

A note on the forest areas of Arizona and New Mexico under private ownership and on the public agencies concerned with land-use problems on such areas together with a brief summary of their programmes.

97.3 : 34.21 : 60 (485). BUNDY, O. Hagmarksomvandling: boskillnad mellan skog och bete. **[The rehabilitation of wooded pastures: separation of property into forest and grazing land.]** *Skogsägaren* 17, 1941 (114–7). [Sw.]

A plea for the abolition of forest grazing, for the improvement of productive forest land at present existing as poorly wooded pasture (hagmark), and for the reforestation of bare forest land, is supported by a calculation to show that in Södermanland the restoration of good forest land to a productive condition should raise the present increment (1,280,000 cu. m.) by an additional 370,000 cu. m., which should in turn increase the annual financial yield by 1–1·5 million kronor.

97.4 : 12.25 : 33.51 : 23.3 (91.4). LANSIGAN, N. P. **Relation between the mining industry and the Benguet Pine forest in the Mountain Province.** *Philipp. J. For.* 4, 1941 (37–55). [Bureau of Forestry, Philippines.]

The mining and lumber industries of the Mountain Province of Luzon Island have been largely interdependent in their development. At present nearly 85 per cent. of the total wood cut (127,946 cu. m.) in the Pine forest is used for mine timber. The future of the forest is considered in relation to this drain and the natural regeneration and reforestation that is taking place.

98. THE TIMBER MARKET

98 (481) : 33.06. HAUG, H. Brenselforsyningen i Norge. **[The fuel supply of Norway.]** *Skogsägaren* 17, 1941 (88–91). [Nor.]

The conditions are specified of a contract made in February, 1940, between the Norwegian Forest Owners' Association (Norges Skogseierforbund) and the Norwegian Department of Supply (Forsyningsdepartementet) for the sale of 1·2 million cu. m. stacked measure of fuelwood to the State at agreed prices. The prescribed quantity was cut by July, 1940, and distribution has been proceeding. The State has also subsidized the erection of large sheds for the centralized storage of fuelwood.

98 (59.5) : 33.17. NOAKES, D. S. P. **The sawmill industry of Singapore.** *Malay. For.* 10, 1941 (84–8).

This industry accounts for about half the total sawmill output of Malaya. There are 13 mills, of which one is used for re-sawing only, with maximum daily outputs of 15 to 65 cubic tons, the combined normal monthly output being between 8,000 and 9,000 cubic tons. Equipment and layout of the plants are poor. Almost all are Chinese-owned, and all are steam-driven and worked by unskilled Chinese labour. The mills are badly situated for overland log traffic, and the bulk of the raw timber is brought by sea from neighbouring Dutch islands. Scant sawing is practised, logs are normally cut to a few standard lengths only, timber is usually sold unseasoned, and no grading is done for local markets. That better conditions can be achieved is shown by the satisfactory timber produced, though in small quantity, for the British market. Aid from the Forest Department has resulted in an increase of exports to Britain from 15,000 cu. ft. in 1933 to over 109,000 cu. ft. in 1940, and no serious complaints have been made about the quality, seasoning, or sawing of this timber. The chief obstacle to better sawmilling practice is the tolerance of Eastern markets in general for low-grade material. About a quarter of the

total output is exported, principally to Eastern markets. In 1939 the exports amounted to 24,237 tons, valued at 657,938 Malayan dollars. Notes are included on labour conditions in the mills and on the timbers commonly handled.

98 (74.7). BROWN, N. C. **Lumber consumption and competition in New York State.** *J. For.* 39, 1941 (696–700). [New York State College of Forestry.]

New York, which is a consistent leader among States in lumber consumption, produces only 6·4 per cent. of the total lumber it consumes while it exports nearly 30 per cent. of its total production. Its requirements are largely for softwood dimension stock and most of the portable mills of the State produce hardwoods, special grades and sizes of which are exported to markets outside the State. The requirements of the New York market and the present source of supplies are discussed and it is emphasized that foresters must keep in touch with market requirements and apply this knowledge in milling practice in order to sell State-grown timber profitably.

98.3 : 12.25. WHEELER, B. R. **Prices and competition in the Douglas Fir lumber industry.** *Timberman* 42 (9), 1940–41 (12–5, 28).

Evidence from surveys of price flexibility (responsiveness of price to changes in factors affecting it) and from other sources indicates that Douglas Fir lumber prices are extremely flexible and show the behaviour of commodities produced and sold under strong competition. The major external economic factors influencing the Douglas Fir lumber industry are listed and discussed.

NOTES FROM THE DAILY AND THE NON-TECHNICAL PRESS

References: 1. *Argus*, Melbourne. 2. *Berliner Börsen-Zeitung*, Berlin. 3. *Chicago Tribune*, Chicago. 4. *Courier-Mail*, Brisbane. 5. *Defense*, Washington. 6. *Deutsche Volkswirt*, Berlin. 7. *Diário da Manhã*, Lisbon. 8. *Foreign Commerce Weekly*, Washington. 9. *Fritt Folk*, Oslo. 10. *Hamburger Fremdenblatt*, Hamburg. 11. *Madrid*, Madrid. 12. *Nacion*, Santiago. 13. *Nacional*, Mexico D.F. 14. *Neue Züricher Zeitung*, Zürich. 15. *Neues Wiener Tagblatt*, Vienna. 16. *New York Sun*, New York. 17. *Seculo*, Lisbon. 18. *Sydney Morning Herald*, Sydney. 19. *Universal*, Mexico D.F. 20. *Wall Street Journal*, New York. The numbers in brackets indicate the reference number and the date of publication of the newspapers to which the annotations refer.

Australia. A new Australian industry was inaugurated in May, 1941, when the Australian Newsprint Mills Pty. Ltd., at Boyer, Tasmania, was inspected under full working conditions by directors of the company and visitors from the mainland, including the Minister for the Interior. The chairman of directors, stating that expansion of the newsprint industry was bound up with war economy, estimated that when the mills reached the height of their present production capacity, £1,500,000 a year would be saved in dollar exchange. If the company could carry out its expansion programme, at least twice that sum would be saved (**1**; 13.5.41). The industry has come into being only after twenty years of patient research, the main problem having been to devise a process for treating Australian hardwoods sufficiently economically to make newsprint production practicable. Although the company will not be able at present to meet Australia's full requirements, which are normally 150,000 tons a year, its output would be an invaluable standby if anything should seriously interfere with Australia's trade in the Pacific. It is hoped that the mills at Boyer will eventually be expanded until an annual production of 100,000 tons is reached (**18**; 12.5.41).

All Federal Government Departments were instructed to equip their vehicles with producer-gas units. In the postal services alone 1,200 vehicles will be affected (**4**; 26.6.41 and **18**; 23.6.41).

Chile. It is reported that 2 million Pesos (exchange approximately 95 Pesos = £1) of public money have been made available for credits to private individuals and societies wishing to undertake afforestation with *Pinus insignis* and *Eucalyptus globulus*. The loans are to be issued for 5 years at a low rate of interest, subject to certain conditions. The timber is to be used eventually in mining and other industries (**12**; 18.7.41).

Germany. As a result of the gale of November, 1940, and other natural calamities, almost 17 million solid cu. m. of timber were blown or damaged. Nevertheless, this timber was used and the total volume extracted exceeded that planned to be cut by only 3 million cu. m. Imports have decreased owing to obstructions to shipping in the Baltic and the cessation of imports from Russia. At the same time, Germany's exports of timber have increased. However, on the 1st October, 1941, the stocks of timber held by concerns of military importance were higher than a year ago. The volume of timber cut expressed as a percentage of the normal cut (estimated annual increment) was 155 per cent. in 1939, 139 per cent. in 1940, and 130 per cent. in 1941. It is thought that in future there should be considerable increase in timber imports from the conquered territories in the East (**2**; 2.10.41 and **6**; 10.10.41).

In order to economize in the use of liquid fuels, new regulations have been issued to speed up the conversion of Diesel-oil motors to producer gas in canal and river boats. Reich subsidies will be granted to owners of tramp ships and goods-carrying motor boats if they undertake to install producer plants. Moreover, the Minister of Transport has promised to refund to owners of gas-propelled steamers any additional running and maintenance costs resulting from the use of solid fuels (**15**; 12.8.41).

In May, 1939, an International Centre of Forestry was opened in Berlin. This Centre is an offshoot of the International Agricultural Institute in Rome. At present the countries represented at the Centre include Axis countries and European countries under Axis domination and, in addition, Spain, Sweden, Switzerland, and Mexico (**10**; 27.9.41).

Mexico. The President of Mexico summoned a National Forestry Convention to be held for the first time in Mexico City during 18–23rd August, 1941. Subjects for discussion were to include forest conservation, silviculture, forest utilization, and various problems of legislation, policy, and organization as affecting Mexican forestry. Representatives of Government organizations, private

enterprises, and workers' and peasants' organizations having an interest in forestry, and of the National Credit Banks, were to be among the delegates (**13**; 12.6.41).

In a leader of (**19**; 19.6.41) it is pointed out that woodlands amount to only about 14 per cent. of the land area of Mexico, and that much of the forest land has been depleted of productive timber. Regulation of timber exploitation is considered the most urgent task of Mexican forestry.

Norway. It is reported that recent experiments with fishing boats driven by wood gas have been completed with good results. Preliminary tests aiming at converting Diesel and other oil engines were completed last winter at Trondheim. Since then, practical trials have taken place under the Directorate of Fisheries in co-operation with the State Gas Generator Council and the financial assistance of the Department of Trade. As a result of these trials, suitable producer units are now available and are being delivered by the State on certain conditions. Wood is generally used as a fuel, but charcoal may also be employed (**9**; 22.8.41).

Portugal. The pitprop industry, which had by far its biggest market in South Wales, is reported to be practically paralysed by the war, with a consequent loss to the country's economy of large sums of money and hardship to workers previously engaged in the industry (**7**; 31.8.41).

Attention is directed to the serious condition of the sawmill industry, which has been badly hit by war conditions, and especially by the collapse of France. Much capital and many thousands of workers are said to be involved, and it is urged that this State-neglected industry should be organized on a corporative basis (**17**; 16.9.41).

Spain. The afforestation, over a period of 10 years, of 340,000 ha. of river-basin land at a cost of 389 million Pesetas (exchange during 1937, 69 to 90 Pesetas = £1) forms part of the National Plan of Public Works (**11**; 27.10.41). In the Murcia region this winter 2 million Pines are to be planted. A commission of German foresters, invited by the Spanish Government, was to arrive early in November on a tour of forest regions, especially in the Levante (**11**; 29.10.41).

Sweden. Sweden's principal automobile factory, the Aktiebolaget Volvo, increased its earnings in 1940, in spite of reduced production, by the sale of 7,500 charcoal-gas producers of the trailer type, the aggregate value of which was equivalent to 2,500 motor cars (**8**; 17.5.41).

It is reported that the A. B. Nordisk Silkecellulosa, Norrköping, has expanded its cellulose-wool production during recent months from 4 to 18 tons per day, and now has an annual production of about 5,400 tons. The other Swedish factory, the A. B. Svenskt Konstsilke, Borås, which collaborates with the Société de la Viscose of Emmenbrücke, has increased its production to 1,200 tons per annum. It is thought that the two factories will cover half of the Swedish requirements. Several commercial firms are endeavouring to collect the capital for a further cellulose-wool factory (**14**; 31.7.41).

United States. The output of lumber in the United States during 1940 has been put at 27,000 million bd. ft., an increase of 2,000 million ft. over 1939. Heavy Government purchases, combined with big requirements of private contractors for defence projects, pushed wholesale prices at the end of 1940 to the highest level for years; they had increased about 35 per cent. since the emergency defence buying began. It was also reported to be difficult to obtain lumber for private use (**3**;16.10.40 and **20**; 20.2.41). On the 1st March, 1941, it was announced that the army was to acquire a large reserve of lumber, which it could use when there were 'unexpected demands for immediate deliveries'; the scheme was drawn up in co-operation with the industry and was expected to have a steadying effect on the market. Lumber consumption in 1941 has been running about 20 per cent. higher than in 1940, but production appears to be keeping pace with it. OPACS (Office of Price Administration and Civilian Supply) has taken various steps to prevent price increases in certain types of wood products, in particular plywood and high-grade West Coast lumber (**16**; 13.3.41).

The U.S.A. has been not only the world's leading producer and consumer of wood pulp and paper, but also one of the largest importers of these products. As a result of the interruption of imports from Europe, domestic production of wood pulp has increased substantially; with the addition of imports from Canada, it was expected to meet both domestic and export requirements in 1941, provided there was no great increase in demand. But in July the paper industry was operating at over 100 per cent. of normal capacity and a shortage of sulphite pulp was said to be imminent. It was reported that the Government had asked for monthly deliveries of 8,000 tons of sulphite pulp

by September, to be increased to 10,000 or 15,000 tons a month by the beginning of 1942, for use in explosives. Exports of wood pulp were 245 per cent. higher in 1940 than in 1939, aggregating 481,000 tons; but since these exports went mainly to Great Britain and Latin America, any curtailment was considered to be undesirable (**8**; 22.3.41 and **20**; 10.7.41). In view of the shortage of wood pulp an appeal has been issued to the public to conserve waste paper, and the waste-paper industry has agreed not to raise its prices (**20**; 21.6.41 and 19.7.41).

In 1940, U.S. imports of cork exceeded 207,000 short tons; the country was entirely dependent for its supply on Spain, Portugal, and North Africa, and shipments from North Africa have now ceased. Imports in 1942 are expected to amount at most to 150,000 short tons, while it is estimated that the overall demand will be at least 172,000 tons. At present the use of cork for civilian requirements is being restricted, and it is thought that the shortage of cork for civilian consumption will be greater than that of any other material, except aluminium (**5**; 29.4.41, 3.6.41, and 10.6.41).

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